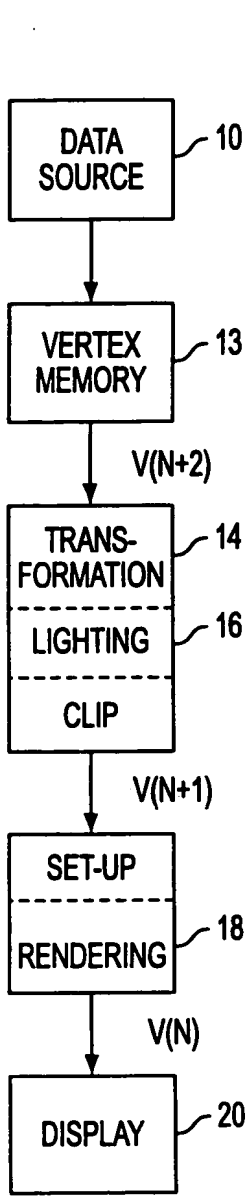

FIG. 1
(PRIOR ART)

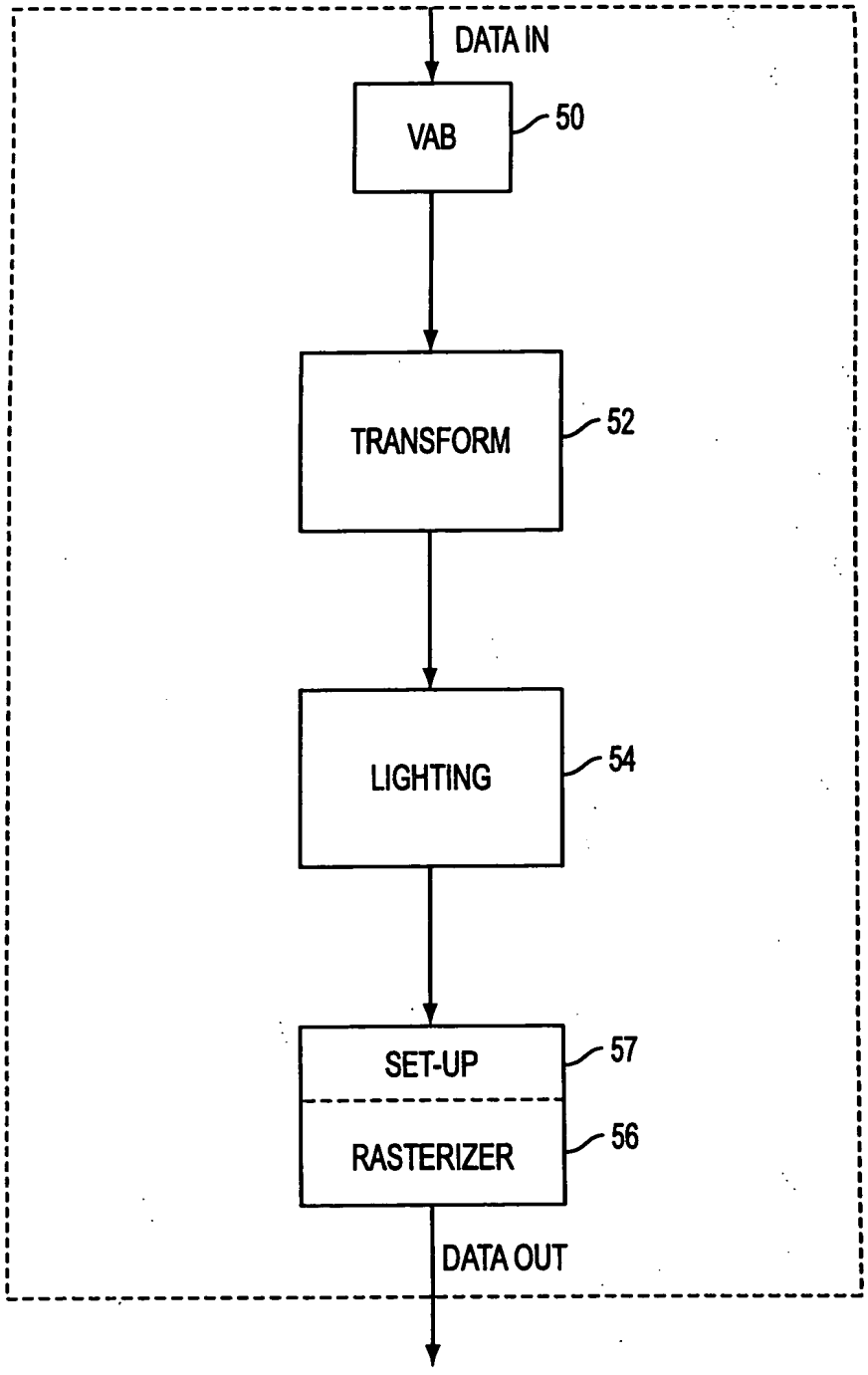
DATA IN
VAB
50
TRANSFORM
52
LIGHTING
54
SET-UP
57
RASTERIZER
56
DATA OUT

FIG. 1A

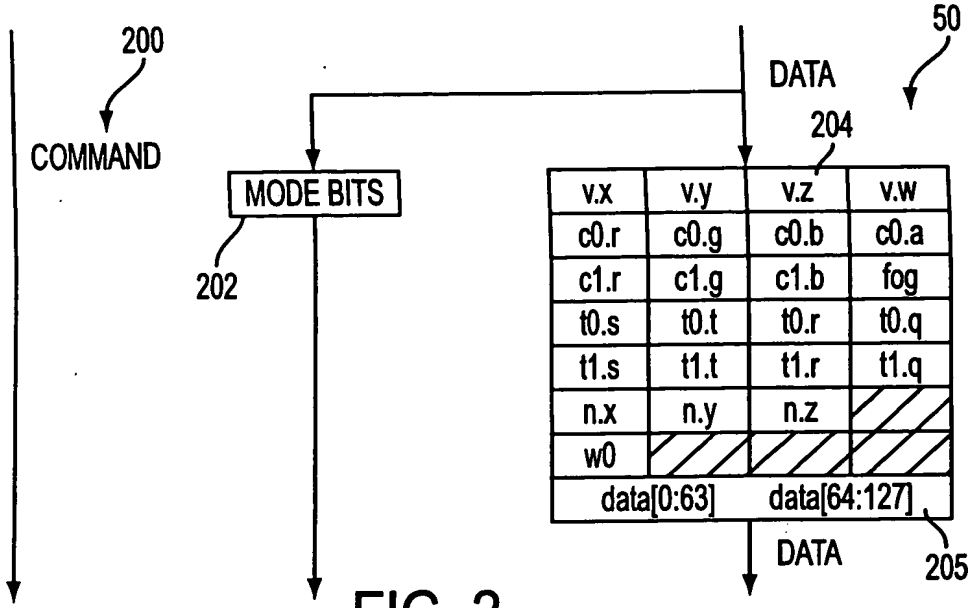

FIG. 2

COMMAND	TRANSFORM STALL	LIGHTING STALL	DESCRIPTION
FE2XF_CMD_NOP			NO OPERATION. CAN BE USED AS A SPACER BETWEEN COMMANDS.
FE2XF_CMD_VERTEX	READ	READ	VERTEX DATA.
FE2XF_CMD_PASSTHR			PASSTHROUGH. TRANSFORM AND LIGHTING PASS THE DATA THROUGH.
FE2XF_CMD_RDVAB			READ THE VAB CONTENTS WHEN CONTEXT SWITCHING.
FE2XF_CMD_LDMODE			LOAD NEW MODE BITS.
FE2XF_CMD_LDXFCTX	WRITE		LOAD TRANSFORM CONTEXT MEMORY DATA.
FE2XF_CMD_RDXFCTX	READ		READ TRANSFORM CONTEXT MEMORY DATA.
FE2XF_CMD_LDLTCTX		WRITE	LOAD LIGHTING CONTEXT MEMORY DATA.
FE2XF_CMD_RDLTCTX		READ	READ LIGHTING CONTEXT MEMORY DATA.
FE2XF_CMD_LDLTC0		WRITE	LOAD LIGHTING CONTEXT0 MEMORY DATA.
FE2XF_CMD_RDLTC0		READ	READ LIGHTING CONTEXT0 MEMORY DATA.
FE2XF_CMD_LDLTC1		WRITE	LOAD LIGHTING CONTEXT1 MEMORY DATA.
FE2XF_CMD_RDLTC1		READ	READ LIGHTING CONTEXT1 MEMORY DATA.
FE2XF_CMD_LDLTC2		WRITE	LOAD LIGHTING CONTEXT2 MEMORY DATA.
FE2XF_CMD_RDLTC2		READ	READ LIGHTING CONTEXT2 MEMORY DATA.
FE2XF_CMD_LTLTC3		WRITE	LOAD LIGHTING CONTEXT3 MEMORY DATA.
FE2XF_CMD_RDLTC3		READ	READ LIGHTING CONTEXT3 MEMORY DATA.
FE2XF_CMD_SYNC	READ+ WRITE	READ+ WRITE	SIMILAR TO NOP, BUT IS NOT ALLOWED TO BE PROCESSED IN PARALLEL.

FIG. 2A

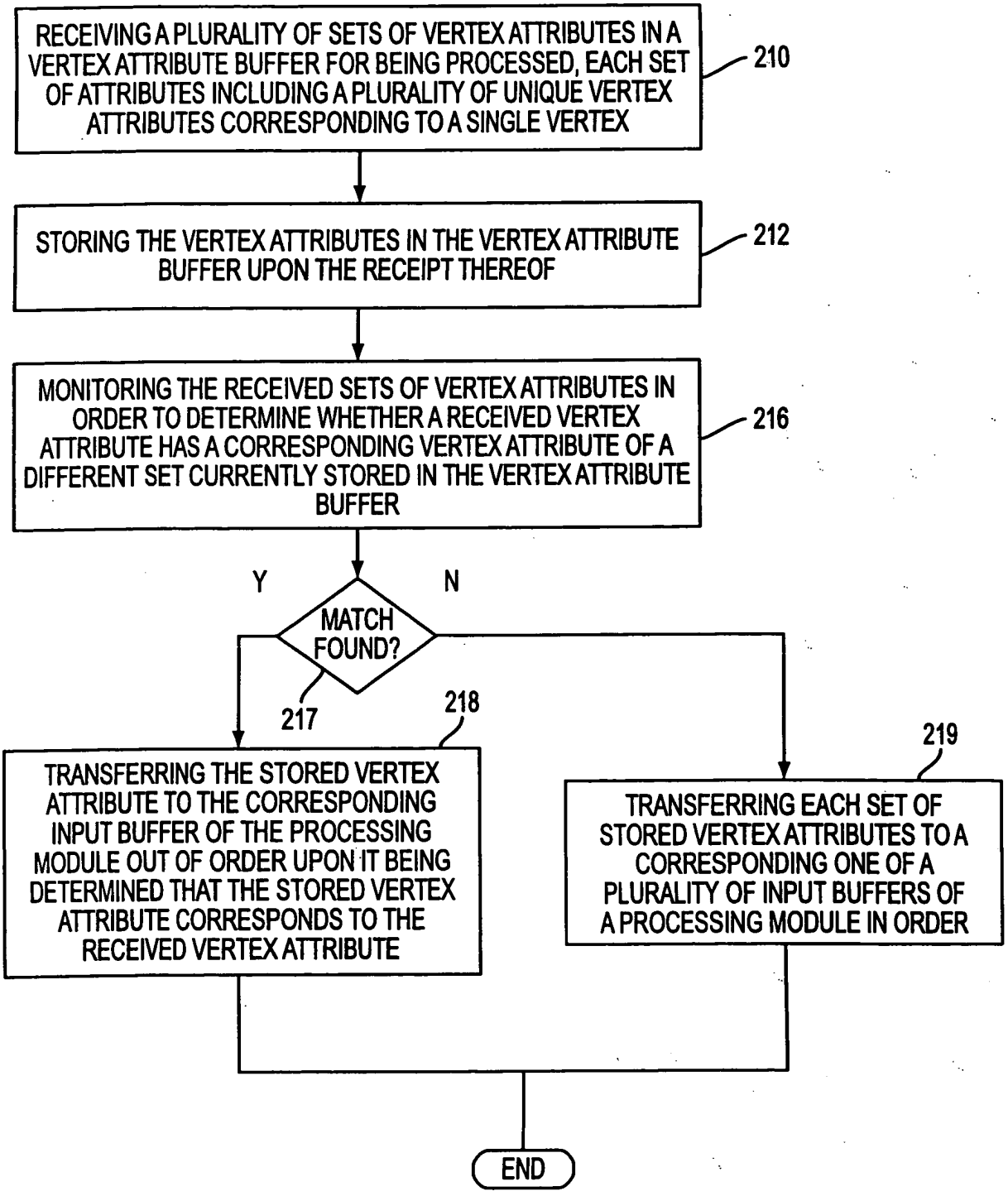
RECEIVING A PLURALITY OF SETS OF VERTEX ATTRIBUTES IN A VERTEX ATTRIBUTE BUFFER FOR BEING PROCESSED, EACH SET OF ATTRIBUTES INCLUDING A PLURALITY OF UNIQUE VERTEX ATTRIBUTES CORRESPONDING TO A SINGLE VERTEX
210
STORING THE VERTEX ATTRIBUTES IN THE VERTEX ATTRIBUTE BUFFER UPON THE RECEIPT THEREOF
212
MONITORING THE RECEIVED SETS OF VERTEX ATTRIBUTES IN ORDER TO DETERMINE WHETHER A RECEIVED VERTEX ATTRIBUTE HAS A CORRESPONDING VERTEX ATTRIBUTE OF A DIFFERENT SET CURRENTLY STORED IN THE VERTEX ATTRIBUTE BUFFER
216
Y
N
MATCH FOUND?
217
218
TRANSFERRING THE STORED VERTEX ATTRIBUTE TO THE CORRESPONDING INPUT BUFFER OF THE PROCESSING MODULE OUT OF ORDER UPON IT BEING DETERMINED THAT THE STORED VERTEX ATTRIBUTE CORRESPONDS TO THE RECEIVED VERTEX ATTRIBUTE
219
TRANSFERRING EACH SET OF STORED VERTEX ATTRIBUTES TO A CORRESPONDING ONE OF A PLURALITY OF INPUT BUFFERS OF A PROCESSING MODULE IN ORDER
END

FIG. 2B

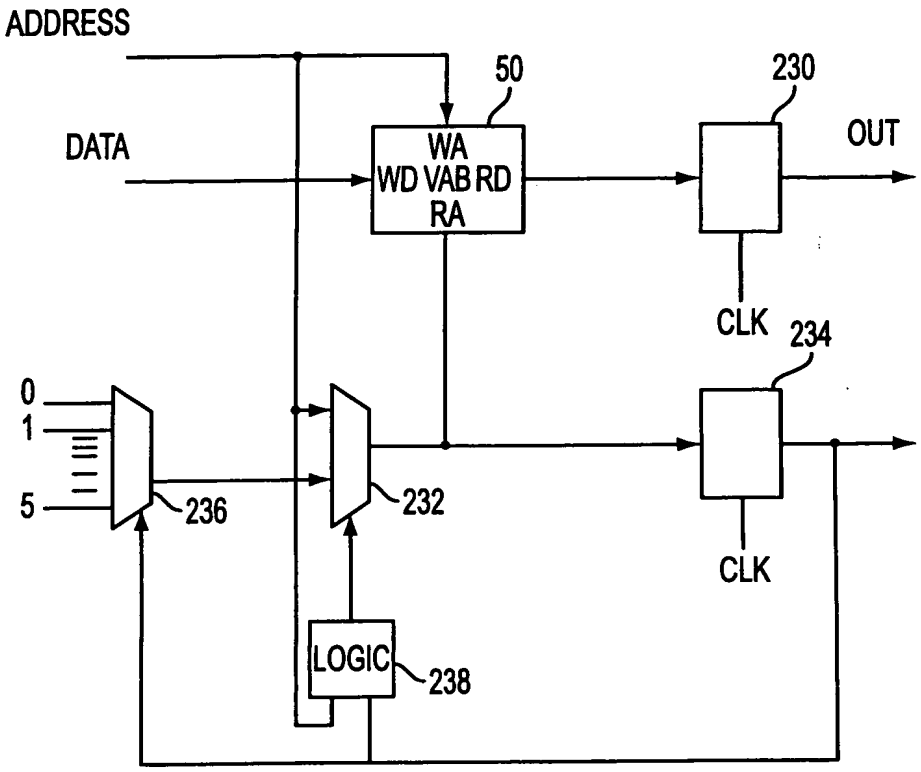
ADDRESS
DATA
50
WA
WD VAB RD
RA
230
OUT
CLK
234
0
1
5
236
232
CLK
LOGIC
238

FIG. 2C

MODE BIT	BITS	DESCRIPTION
T0	1	TEXTURE 0 ENABLE
TXF0	1	TEXTURE 0 MATRIX TRANSFORM ENABLE
TDV0	1	TEXTURE 0 w DIVIDE ENABLE
T0S	3	TEXTURE 0 TEXGEN s CONTROL
T0T	3	TEXTURE 0 TEXGEN t CONTROL
T0U	3	TEXTURE 0 TEXGEN r CONTROL
T0Q	2	TEXTURE 0 TEXGEN q CONTROL
T1	1	TEXTURE 1 ENABLE
TXF1	1	TEXTURE 1 MATRIX TRANSFORM ENABLE
TDV1	1	TEXTURE 1 w DIVIDE ENABLE
T1S	3	TEXTURE 1 TEXGEN s CONTROL
T1T	3	TEXTURE 1 TEXGEN t CONTROL
T1U	3	TEXTURE 1 TEXGEN r CONTROL
T1Q	2	TEXTURE 1 TEXGEN q CONTROL
ETY	1	EYE TYPE INFINITE(0) OR LOCAL(1)
LIT	1	LIGHTING ENABLE
NRM	1	NORMAL NORMALIZE ENABLE
FOG	1	FOG ENABLE
LIS	16	LIGHT STATUS (8 LIGHTS BY 2 BITS EACH, 0:OFF,1:INFINITE,2:LOCAL,3:SPOTLIGHT)
FG	2	FOGGEN CONTROL(0: OFF, 1:RADIAL, 2: PLANE)
LAT	1	LIGHT ATTENUATION CONTROL (0: INVERT, 1: NO INVERT)
C1I	1	SPECULAR COLOR INPUT ENABLE
C1O	1	SPECULAR COLOR OUTPUT ENABLE
CM	4	COLOR MATERIAL CONTROL (1: EMISSIVE, 2: AMBIENT, 4: DIFFUSE, 8:SPECULAR)
PP	1	POINT PARAMETER ENABLE
SKIN	1	SKINNING ENABLE
VPAS	1	VERTEX PASS ENABLE

FIG. 3

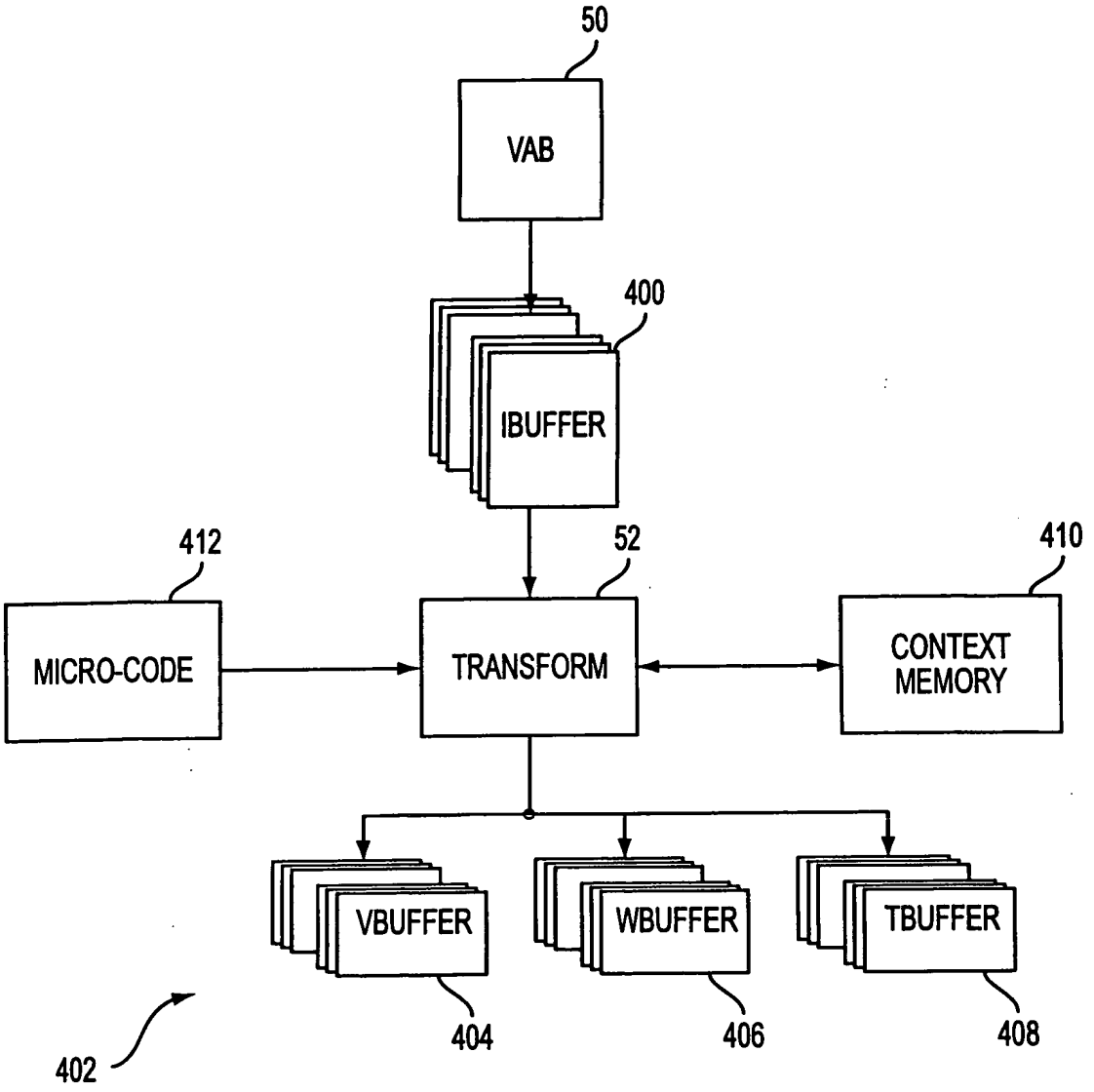
50
VAB
400
IBUFFER
412
52
410
MICRO-CODE
TRANSFORM
CONTEXT MEMORY
VBUFFER
WBUFFER
TBUFFER
404
406
408
402

FIG. 4

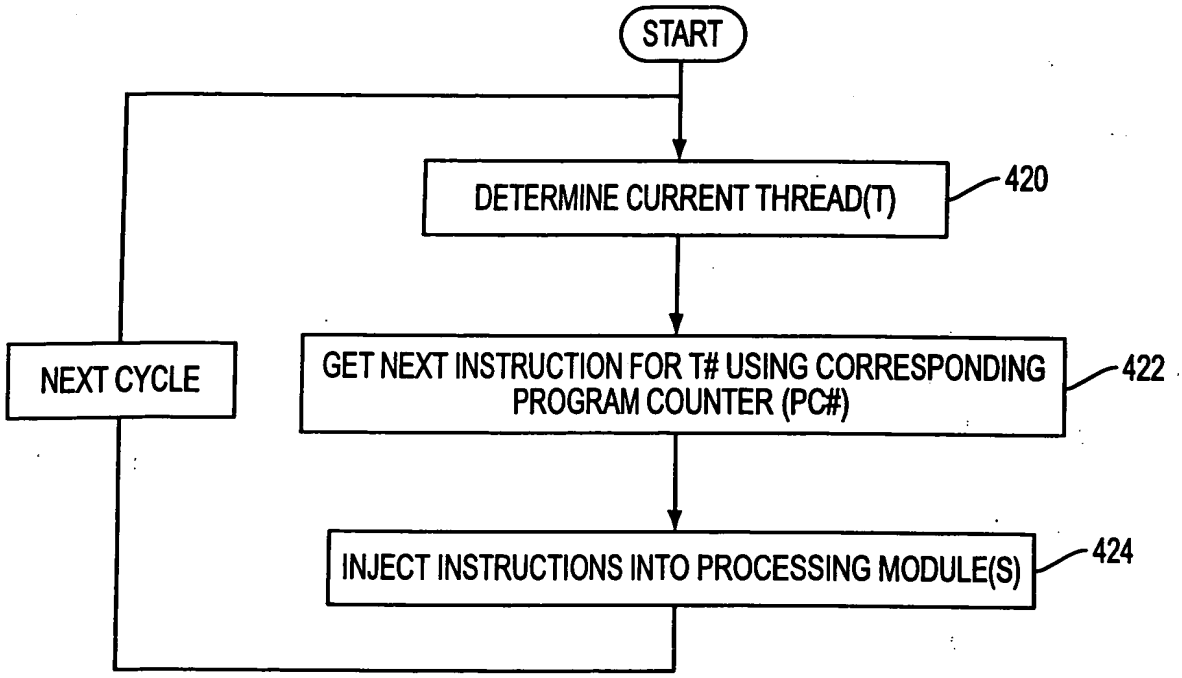
START
DETERMINE CURRENT THREAD(T)
420
GET NEXT INSTRUCTION FOR T# USING CORRESPONDING PROGRAM COUNTER (PC#)
422
INJECT INSTRUCTIONS INTO PROCESSING MODULE(S)
424
NEXT CYCLE

FIG. 4A

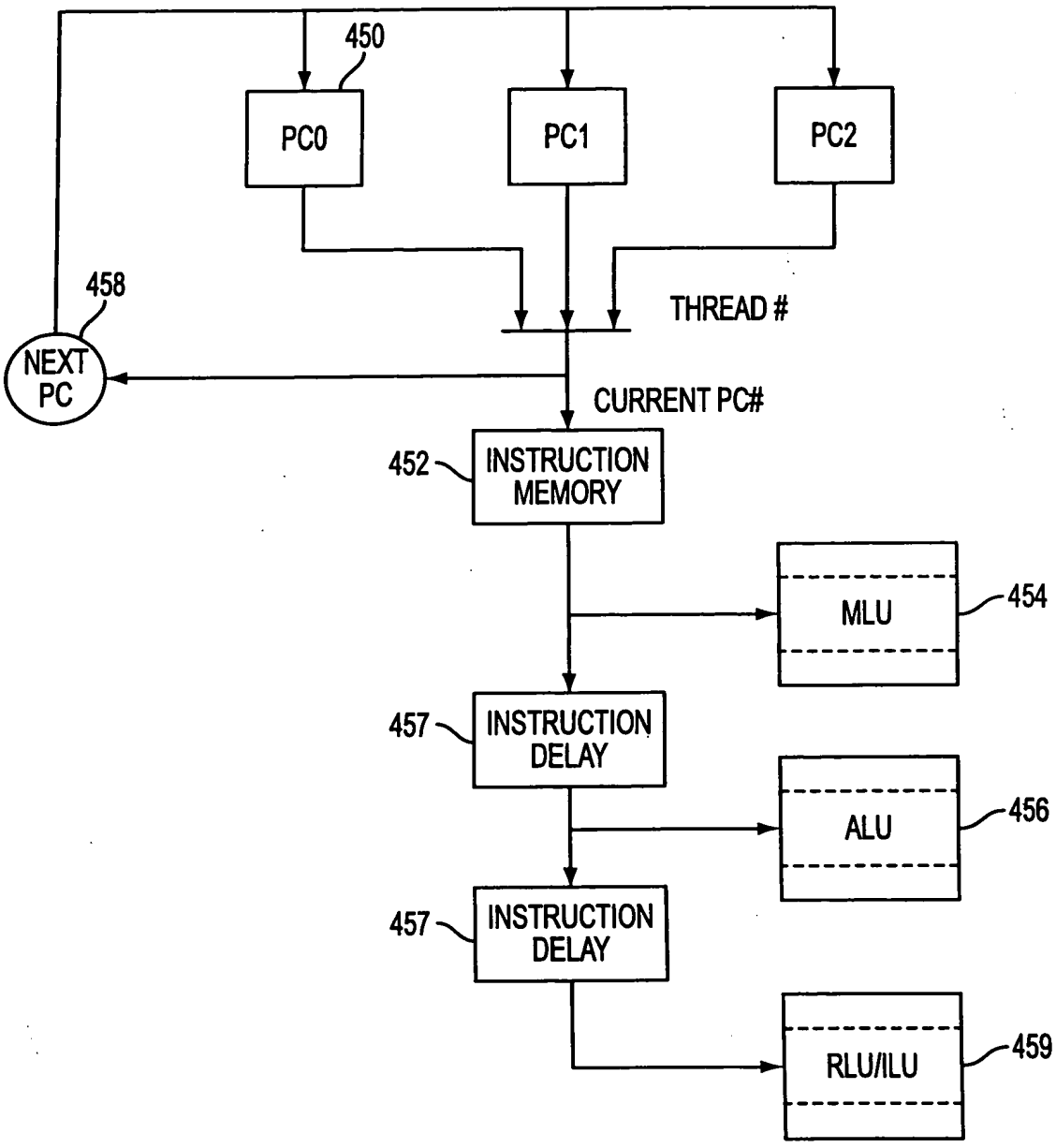
450
PC0
PC1
PC2
458
NEXT PC
THREAD #
CURRENT PC#
452
INSTRUCTION MEMORY
MLU
454
457
INSTRUCTION DELAY
ALU
456
457
INSTRUCTION DELAY
RLU/ILU
459

FIG. 4B

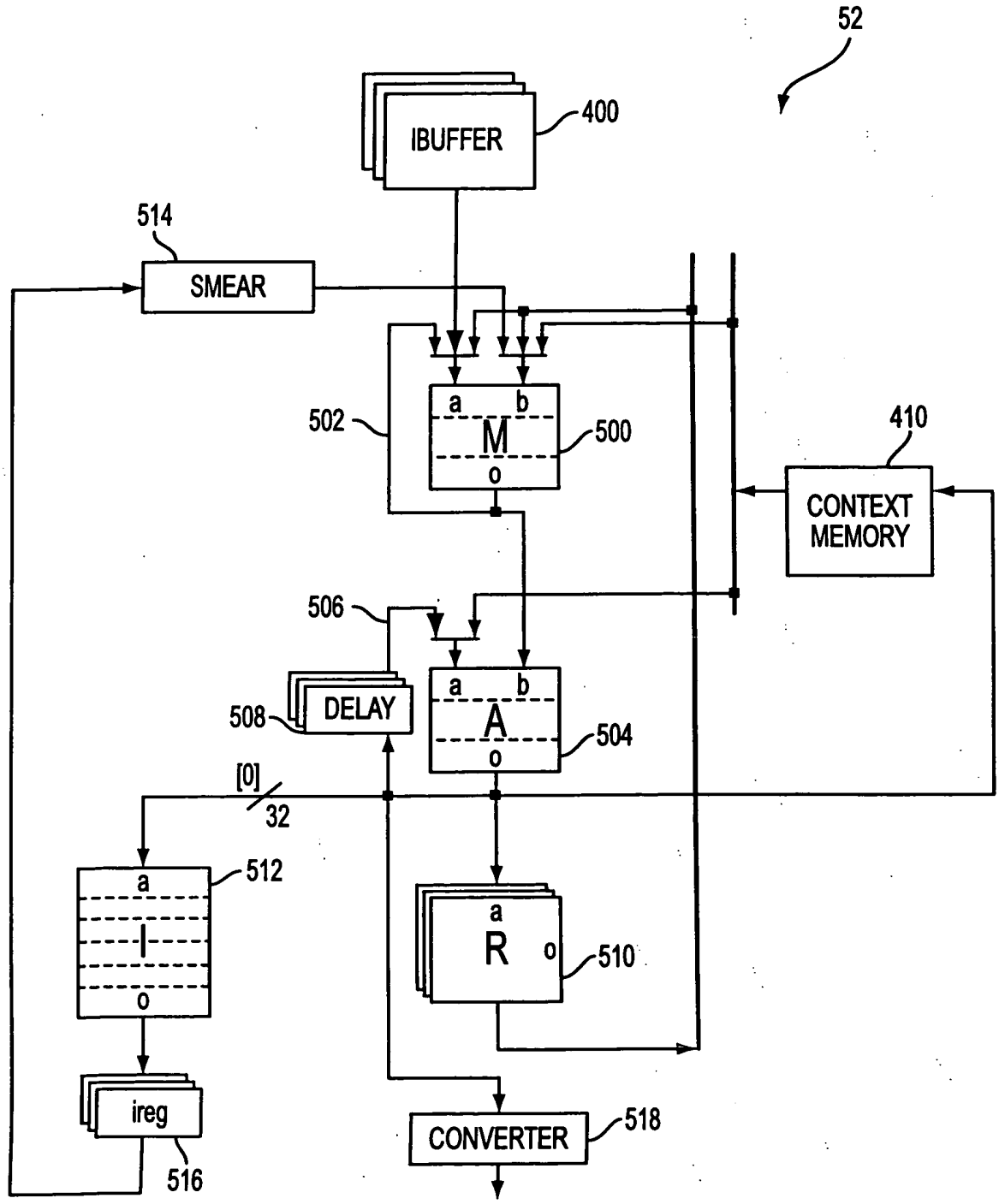
52
IBUFFER
400
514
SMEAR
a
b
M
o
502
500
410
CONTEXT MEMORY
506
DELAY
508
a
b
A
o
504
[0]
32
512
a
I
o
a
R
o
510
ireg
516
CONVERTER
518

FIG. 5

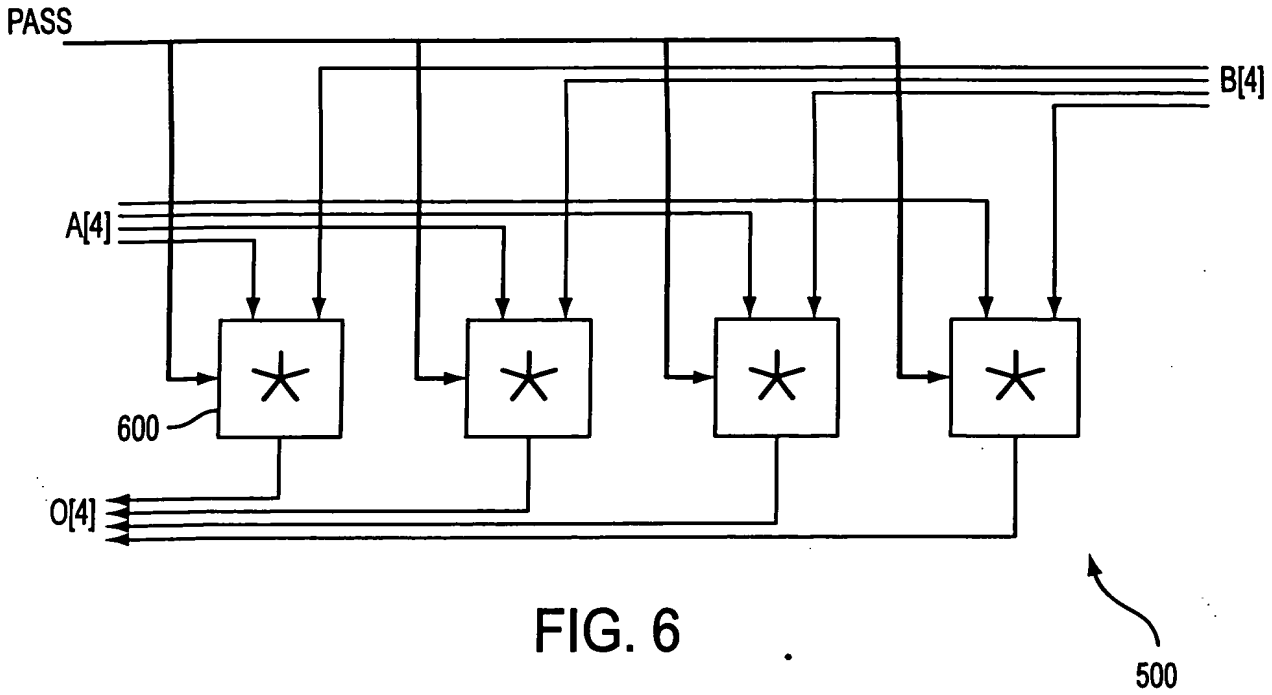
PASS
B[4]
A[4]
600
O[4]
500

FIG. 6

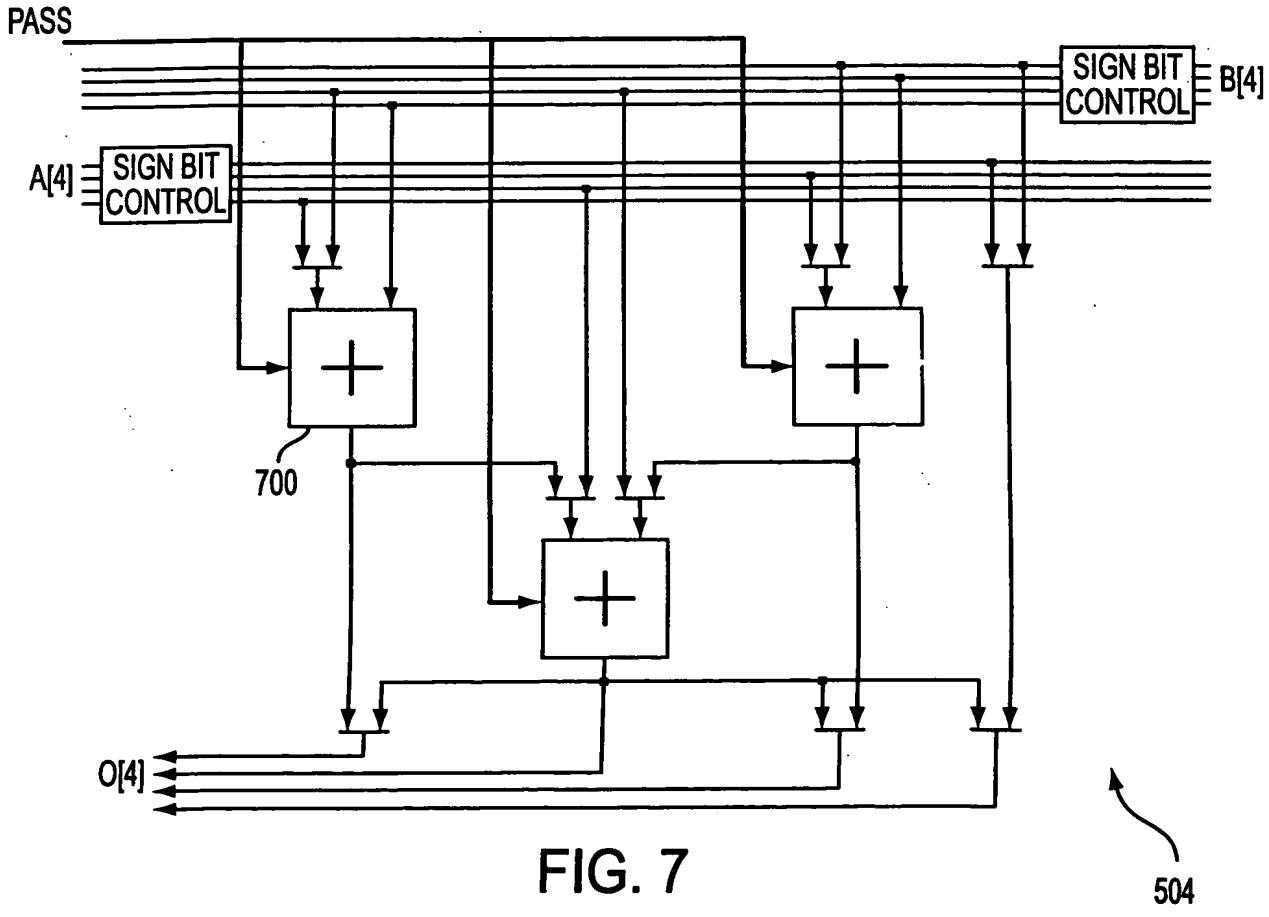
PASS
SIGN BIT CONTROL
B[4]
A[4]
SIGN BIT CONTROL
700
O[4]
504

FIG. 7

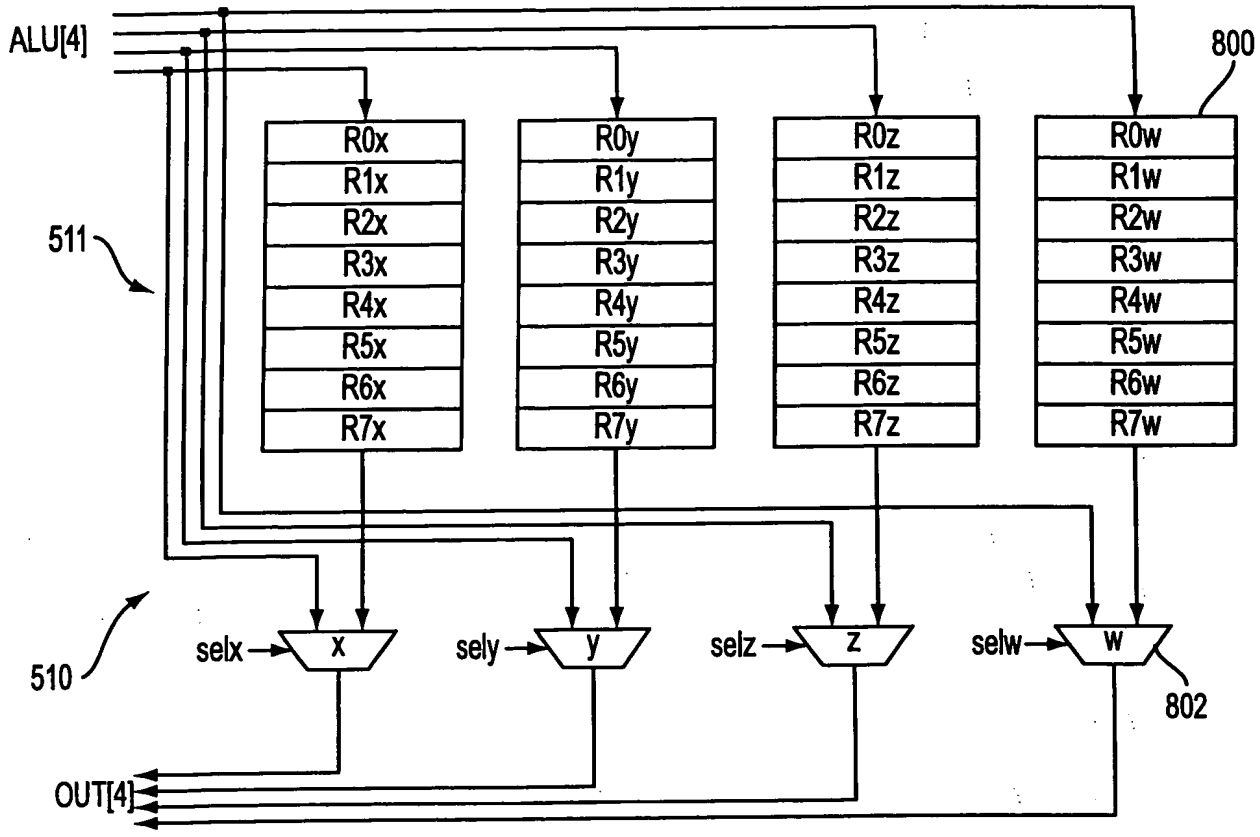
ALU[4]
800
R0x
R1x
R2x
R3x
R4x
R5x
R6x
R7x
R0y
R1y
R2y
R3y
R4y
R5y
R6y
R7y
R0z
R1z
R2z
R3z
R4z
R5z
R6z
R7z
R0w
R1w
R2w
R3w
R4w
R5w
R6w
R7w
511
510
selx
x
sely
y
selz
z
selw
w
802
OUT[4]

FIG. 8

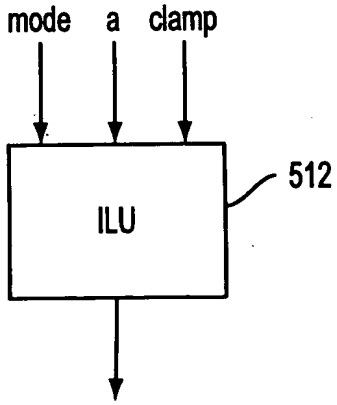
mode
a
clamp
ILU
512

FIG. 9

ADDRESS	TARGET	ACTION	DESCRIPTION
TPOS	TBUFFER	T[0] = ALU	POSITION
TT0	TBUFFER	T[3] = ALU	TEXTURE0
TT1	TBUFFER	T[4] = ALU	TEXTURE1
WEV	WBUFFER,VBUFFER	W[0] = ALU, V[0].y = ALU.w	EYE VECTOR
WLV0	WBUFFER,VBUFFER	W[1] = ALU, V[1].y = ALU.w	LIGHT0 DIRECTION VECTOR
WLV1	WBUFFER,VBUFFER	W[2] = ALU, V[2].y = ALU.w	LIGHT1 DIRECTION VECTOR
WLV2	WBUFFER,VBUFFER	W[3] = ALU, V[3].y = ALU.w	LIGHT2 DIRECTION VECTOR
WLV3	WBUFFER,VBUFFER	W[4] = ALU, V[4].y = ALU.w	LIGHT3 DIRECTION VECTOR
WLV4	WBUFFER,VBUFFER	W[5] = ALU, V[5].y = ALU.w	LIGHT4 DIRECTION VECTOR
WLV5	WBUFFER,VBUFFER	W[6] = ALU, V[6].y = ALU.w	LIGHT5 DIRECTION VECTOR
WLV6	WBUFFER,VBUFFER	W[7] = ALU, V[7].y = ALU.w	LIGHT6 DIRECTION VECTOR
WLV7	WBUFFER,VBUFFER	W[8] = ALU, V[8].y = ALU.w	LIGHT7 DIRECTION VECTOR
WSL0	WBUFFER	W[9] = ALU	SPOTLIGHT0 cos
WSL1	WBUFFER	W[10] = ALU	SPOTLIGHT1 cos
WSL2	WBUFFER	W[11] = ALU	SPOTLIGHT2 cos
WSL3	WBUFFER	W[12] = ALU	SPOTLIGHT3 cos
WSL4	WBUFFER	W[13] = ALU	SPOTLIGHT4 cos
WSL5	WBUFFER	W[14] = ALU	SPOTLIGHT5 cos
WSL6	WBUFFER	W[15] = ALU	SPOTLIGHT6 cos
WSL7	WBUFFER	W[16] = ALU	SPOTLIGHT7 cos
VED	VBUFFER	V[0].x = 1.0, V[0].z = ALU.w	EYE RADIAL DISTANCE VECTOR
VLD0	VBUFFER	V[1].x = 1.0, V[1].z = ALU.w	LIGHT0 DISTANCE VECTOR
VLD1	VBUFFER	V[2].x = 1.0, V[2].z = ALU.w	LIGHT1 DISTANCE VECTOR
VLD2	VBUFFER	V[3].x = 1.0, V[3].z = ALU.w	LIGHT2 DISTANCE VECTOR
VLD3	VBUFFER	V[4].x = 1.0, V[4].z = ALU.w	LIGHT3 DISTANCE VECTOR
VLD4	VBUFFER	V[5].x = 1.0, V[5].z = ALU.w	LIGHT4 DISTANCE VECTOR
VLD5	VBUFFER	V[6].x = 1.0, V[6].z = ALU.w	LIGHT5 DISTANCE VECTOR
VLD6	VBUFFER	V[7].x = 1.0, V[7].z = ALU.w	LIGHT6 DISTANCE VECTOR
VLD7	VBUFFER	V[8].x = 1.0, V[8].z = ALU.w	LIGHT7 DISTANCE VECTOR
VC0	VBUFFER,TBUFFER	V[9] = ALU, T[1] = ALU	DIFFUSE COLOR
VC1	VBUFFER,TBUFFER	V[10] = ALU, T[2] = ALU	SPECULAR COLOR
VNRM	VBUFFER	V[11] = ALU	NORMAL VECTOR
VED2	VBUFFER	V[12] = ALU	EYE PLANAR DISTANCE VECTOR
TVW_NOP			NO VALID OUTPUT.

FIG. 10

MICROCODE FIELD	BITS	LOCATION	DELAY	DESCRIPTION
oa	6	0: 5	2	OUTPUT BUFFER WRITE ADDRESS
rra	3	6: 8	0	RLU READ ADDRESS
rwm	4	9:12	2	RLU WRITE MASK
rwa	3	13:15	2	RLU WRITE ADDRESS
ilu	2	16:17	2	ILU OPERATION
alu	4	18:21	1	ALU OPERATION
ais	2	22:23	1	ALU SIGN CONTROL
aia	1	24	1	ALU INPUT A MUX
mlu	3	25:27	0	MLU OPERATION
mib	2	28:29	0	MLU INPUT B MUX
mia	2	30:31	0	MLU INPUT A MUX
va	3	32:34	0	INPUT BUFFER READ ADDRESS
ce	1	35	0,2	CONTEXT MEMORY READ/WRITE
ca	6	36:41	0,2	CONTEXT MEMORY ADDRESS
mr	2	42:43	0	MLU INPUT VECTOR ROTATE

FIG. 11

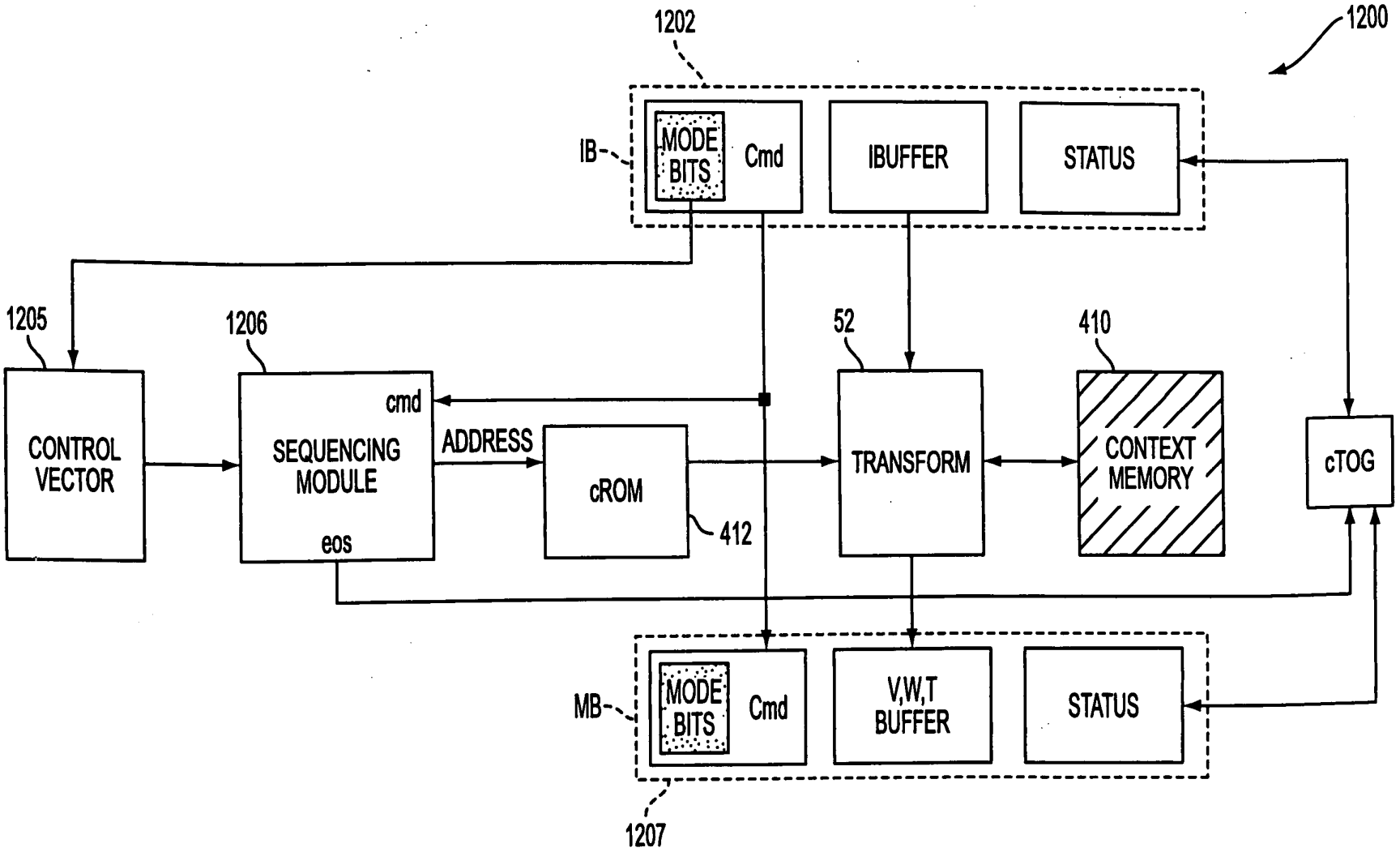
1202
1200
IB
MODE BITS
Cmd
IBUFFER
STATUS
1205
1206
52
410
CONTROL VECTOR
cmd
SEQUENCING MODULE
eos
ADDRESS
cROM
412
TRANSFORM
CONTEXT MEMORY
cTOG
MB
MODE BITS
Cmd
V,W,T BUFFER
STATUS
1207

FIG. 12

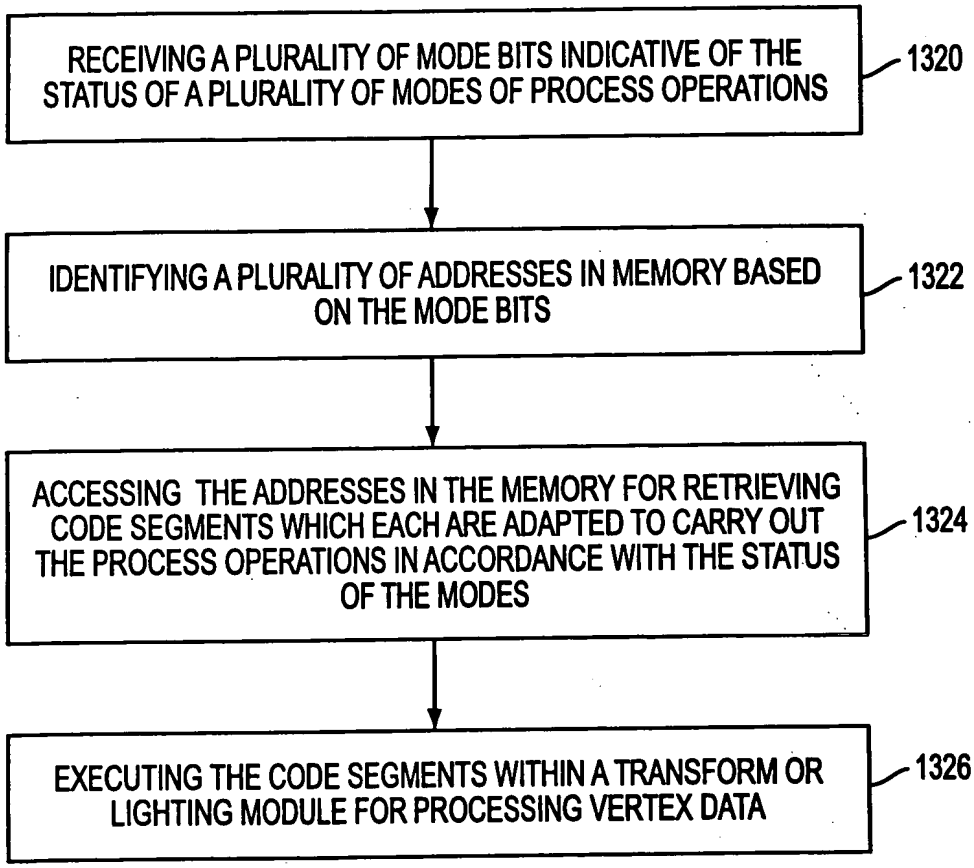
RECEIVING A PLURALITY OF MODE BITS INDICATIVE OF THE STATUS OF A PLURALITY OF MODES OF PROCESS OPERATIONS
1320
IDENTIFYING A PLURALITY OF ADDRESSES IN MEMORY BASED ON THE MODE BITS
1322
ACCESSING THE ADDRESSES IN THE MEMORY FOR RETRIEVING CODE SEGMENTS WHICH EACH ARE ADAPTED TO CARRY OUT THE PROCESS OPERATIONS IN ACCORDANCE WITH THE STATUS OF THE MODES
1324
EXECUTING THE CODE SEGMENTS WITHIN A TRANSFORM OR LIGHTING MODULE FOR PROCESSING VERTEX DATA
1326

FIG. 13

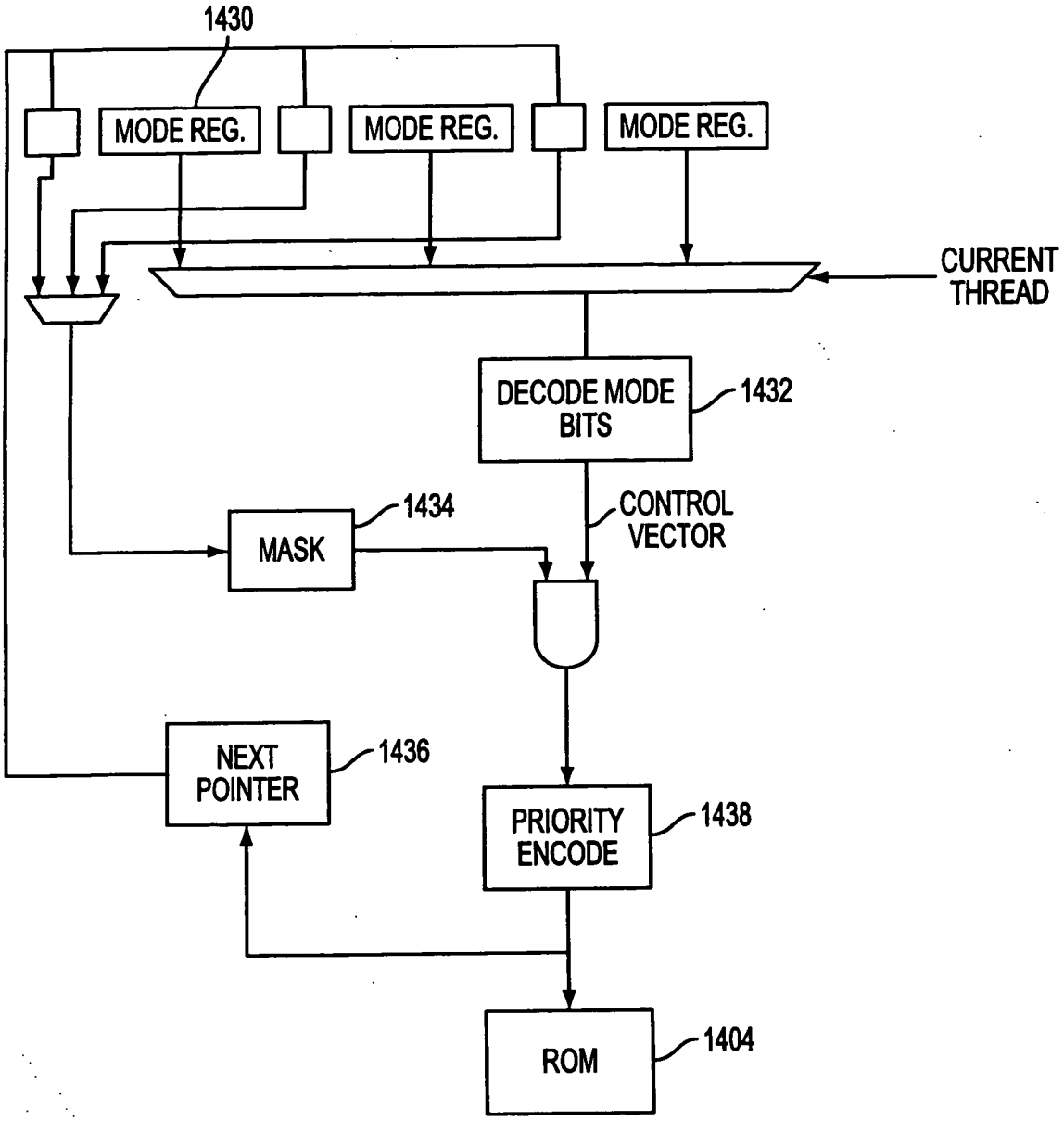
1430
MODE REG.
MODE REG.
MODE REG.
CURRENT THREAD
DECODE MODE BITS
1432
MASK
1434
CONTROL VECTOR
NEXT POINTER
1436
PRIORITY ENCODE
1438
ROM
1404

FIG. 14

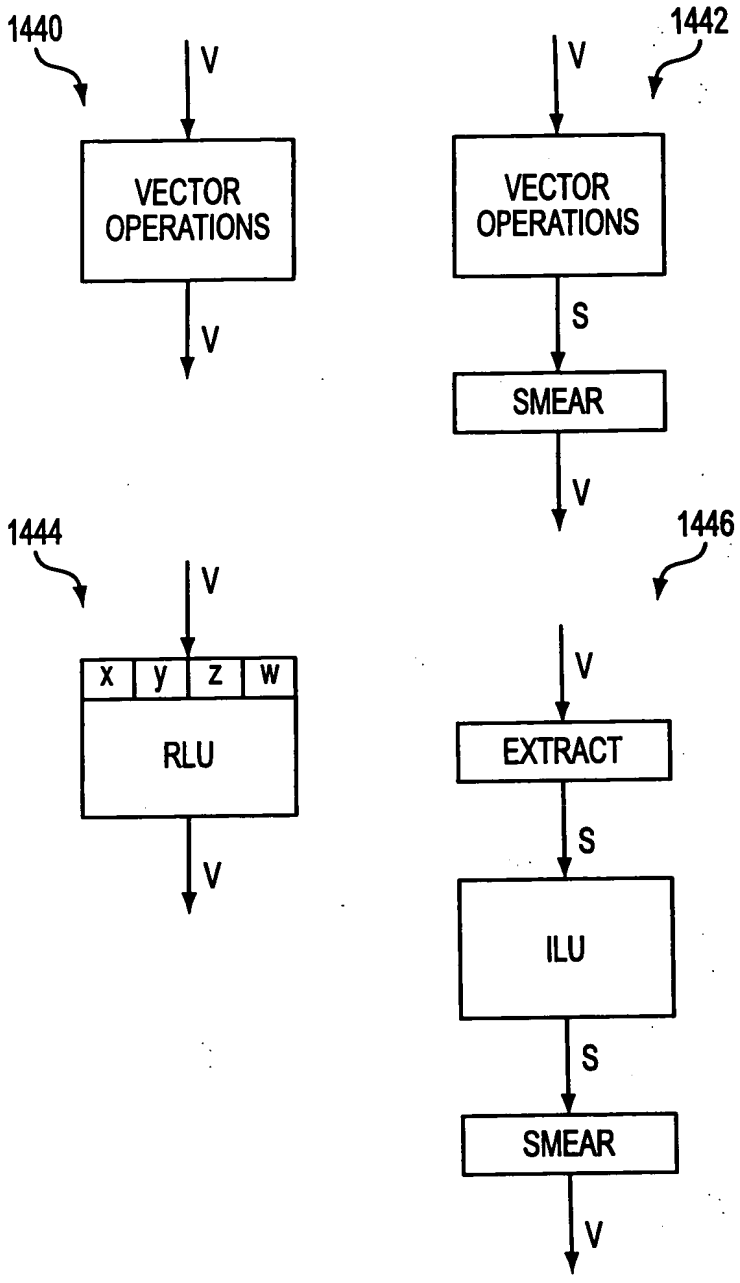
1440
V
VECTOR OPERATIONS
V
1442
V
VECTOR OPERATIONS
S
SMEAR
V
1444
V
x
y
z
w
RLU
V
1446
V
EXTRACT
S
ILU
S
SMEAR
V

FIG. 14A

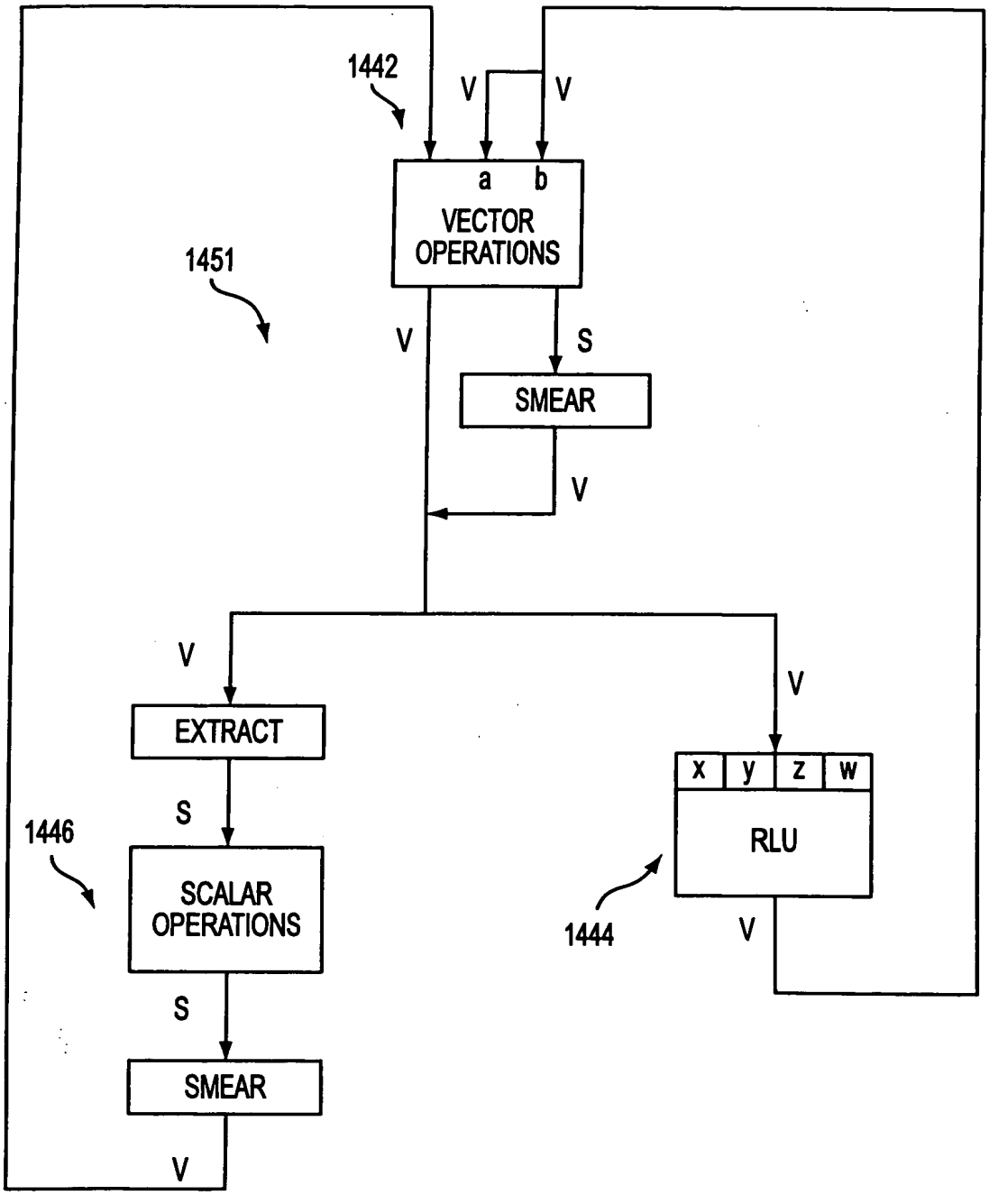
1442
V
V
a
b
VECTOR OPERATIONS
1451
V
S
SMEAR
V
V
V
EXTRACT
S
1446
SCALAR OPERATIONS
S
SMEAR
V
x
y
z
w
RLU
1444
V

FIG. 14B

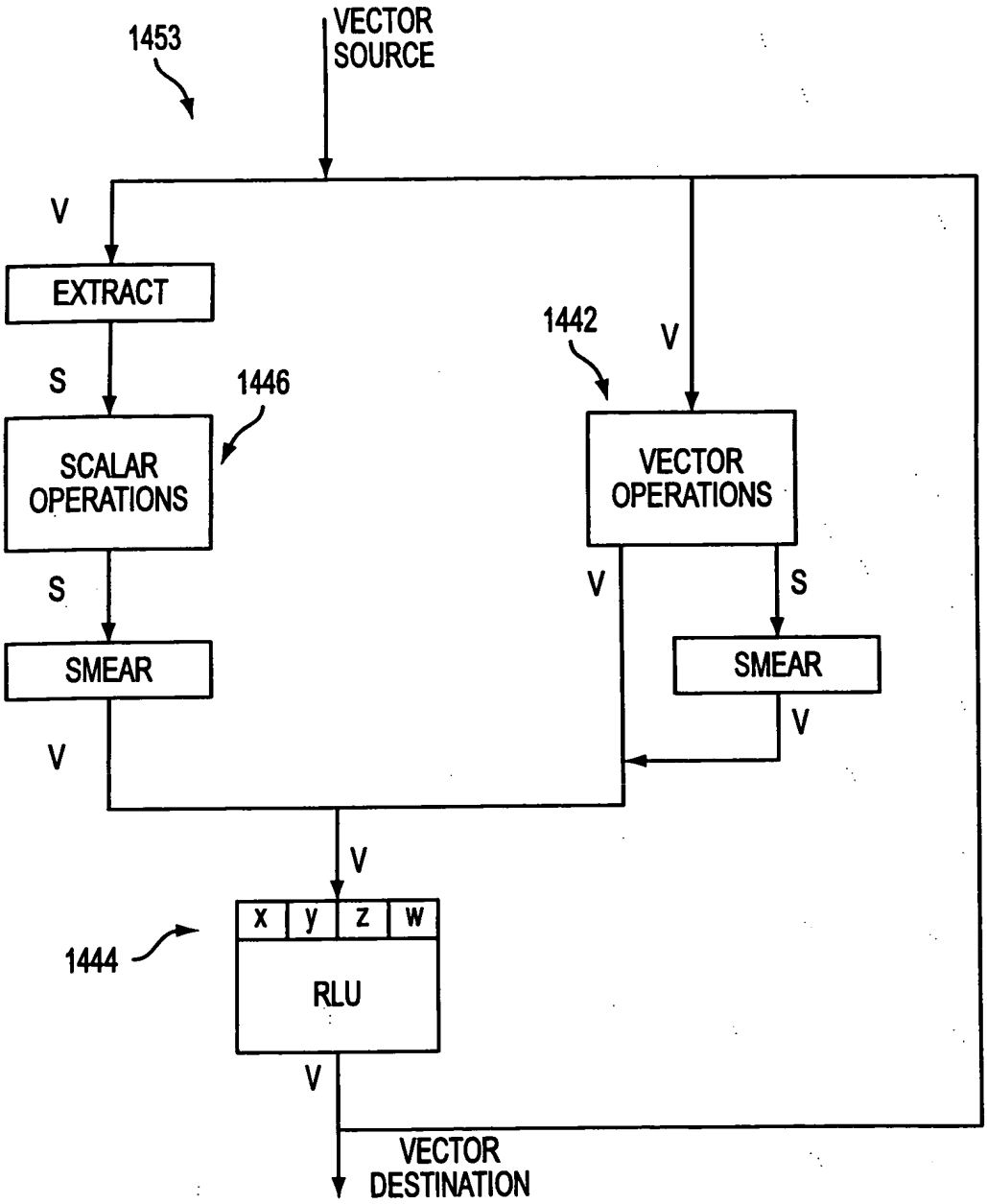
1453
VECTOR SOURCE
V
EXTRACT
S
1446
SCALAR OPERATIONS
S
SMEAR
V
1442
V
VECTOR OPERATIONS
V
S
SMEAR
V
V
1444
x
y
z
w
RLU
V
VECTOR DESTINATION

FIG. 14C

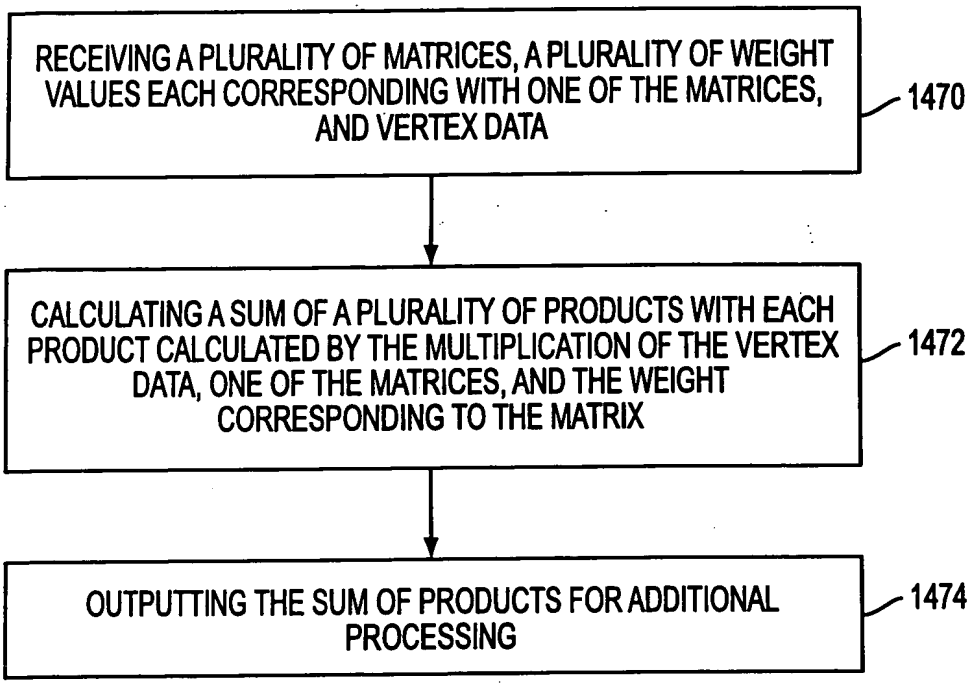
RECEIVING A PLURALITY OF MATRICES, A PLURALITY OF WEIGHT VALUES EACH CORRESPONDING WITH ONE OF THE MATRICES, AND VERTEX DATA
1470
CALCULATING A SUM OF A PLURALITY OF PRODUCTS WITH EACH PRODUCT CALCULATED BY THE MULTIPLICATION OF THE VERTEX DATA, ONE OF THE MATRICES, AND THE WEIGHT CORRESPONDING TO THE MATRIX
1472
OUTPUTTING THE SUM OF PRODUCTS FOR ADDITIONAL PROCESSING
1474

FIG. 14D

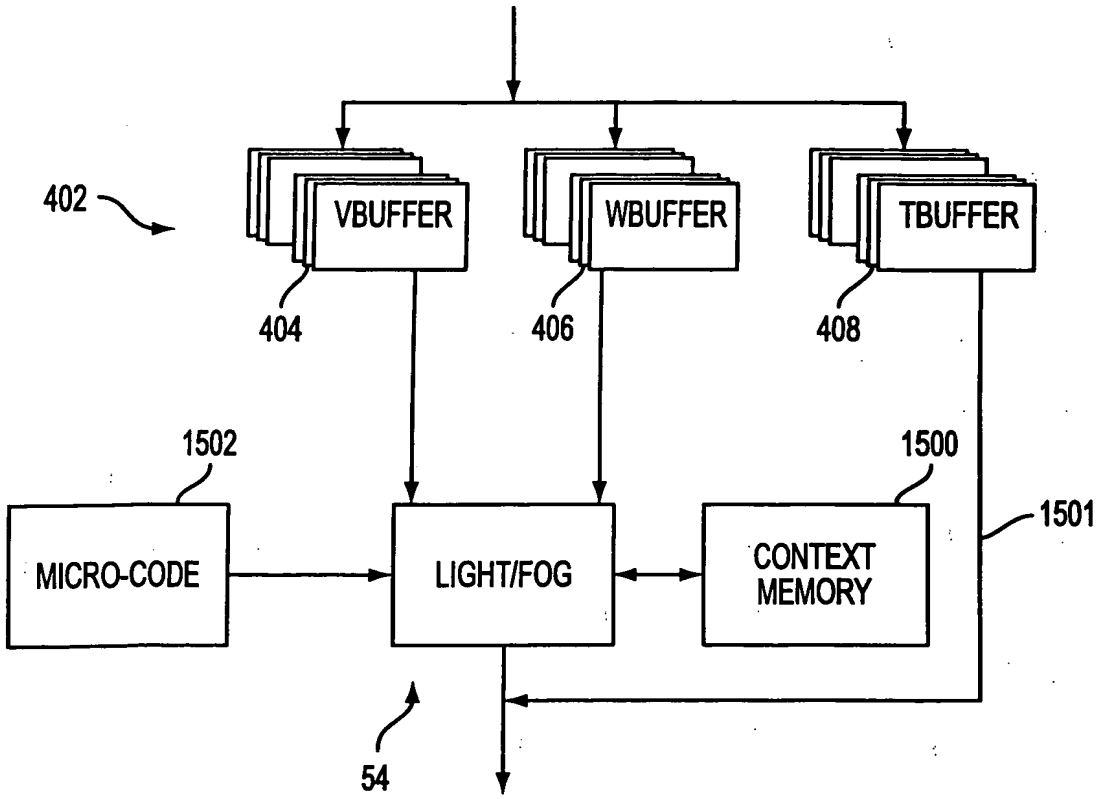
402
VBUFFER
WBUFFER
TBUFFER
404
406
408
1502
1500
1501
MICRO-CODE
LIGHT/FOG
CONTEXT MEMORY
54

FIG. 15

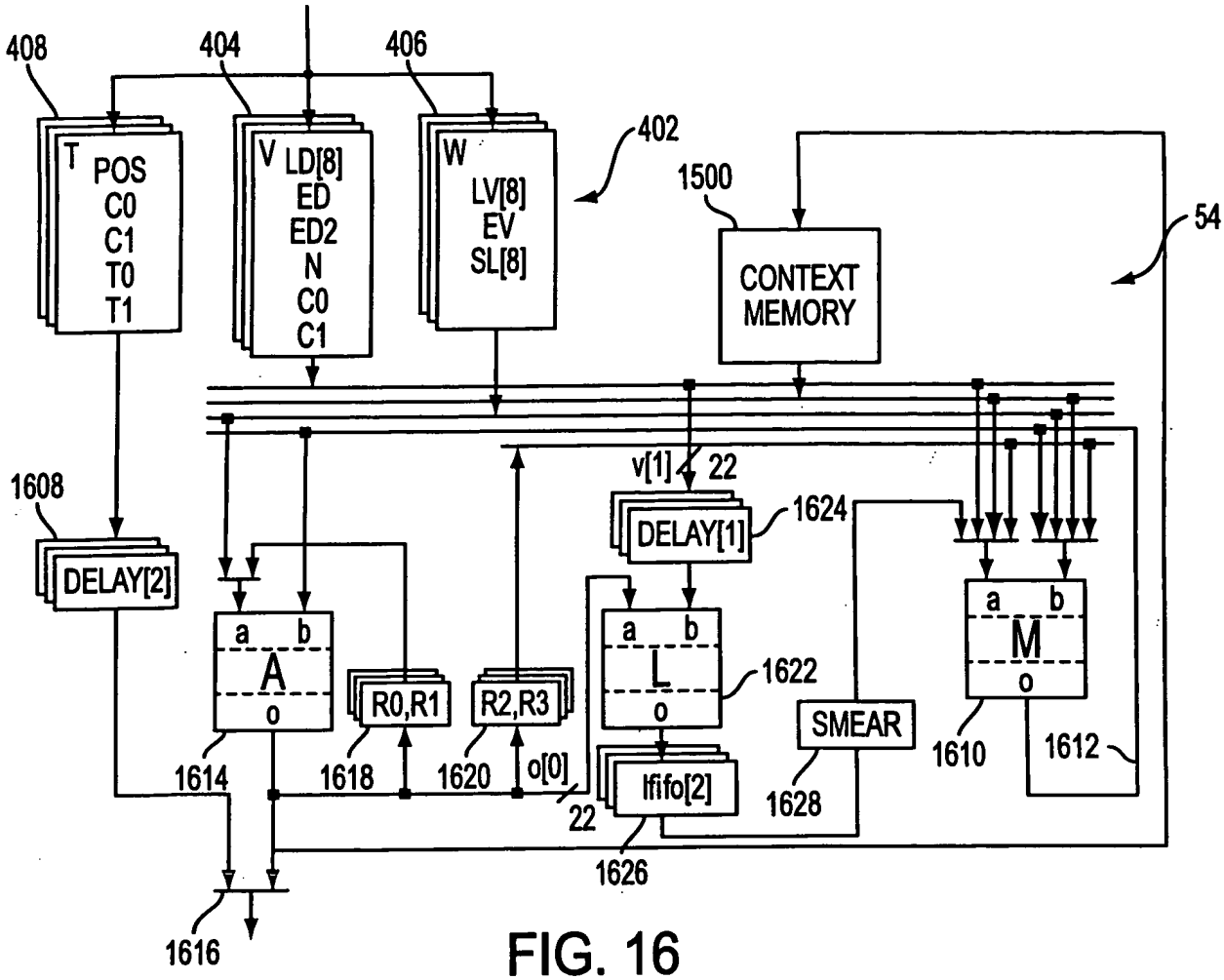
408
404
406
402
1500
54
T
POS
C0
C1
T0
T1
V
LD[8]
ED
ED2
N
C0
C1
W
LV[8]
EV
SL[8]
CONTEXT MEMORY
1608
DELAY[2]
v[1]
22
DELAY[1]
1624
a
b
A
o
R0,R1
R2,R3
o[0]
L
1622
M
SMEAR
1610
1612
1614
1618
1620
lfifo[2]
1628
22
1626
1616

FIG. 16

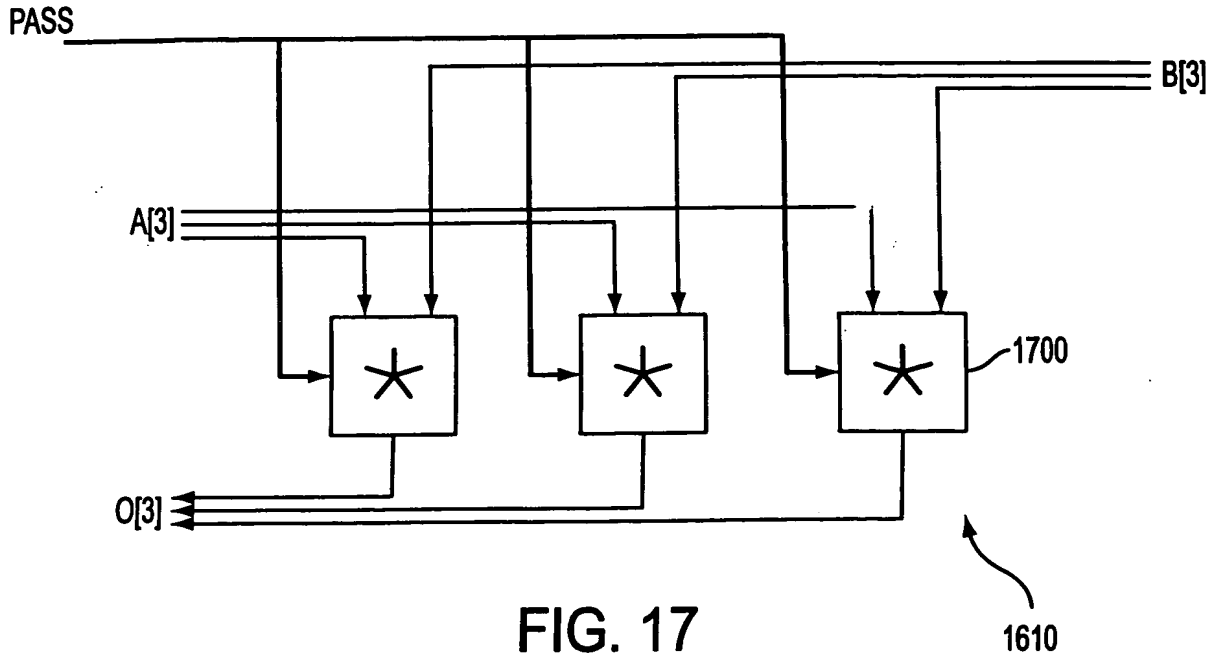
PASS
B[3]
A[3]
1700
O[3]
1610

FIG. 17

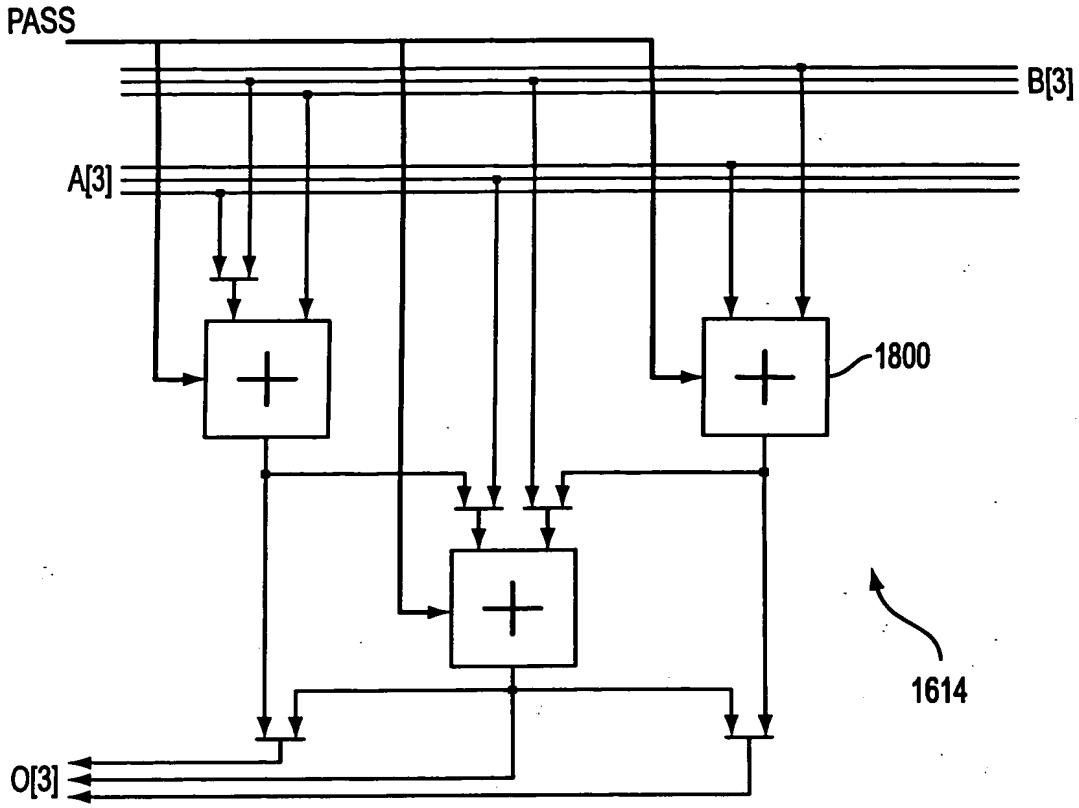
PASS
B[3]
A[3]
1800
1614
O[3]

FIG. 18

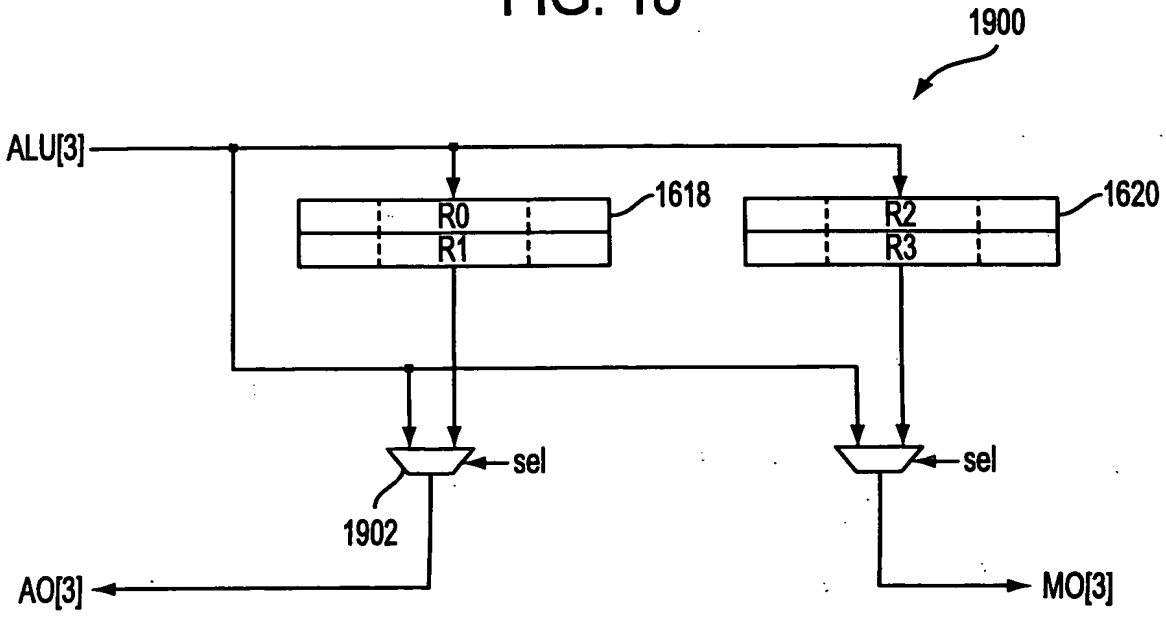
1900
ALU[3]
R0
R1
1618
R2
R3
1620
sel
sel
1902
AO[3]
MO[3]

FIG. 19

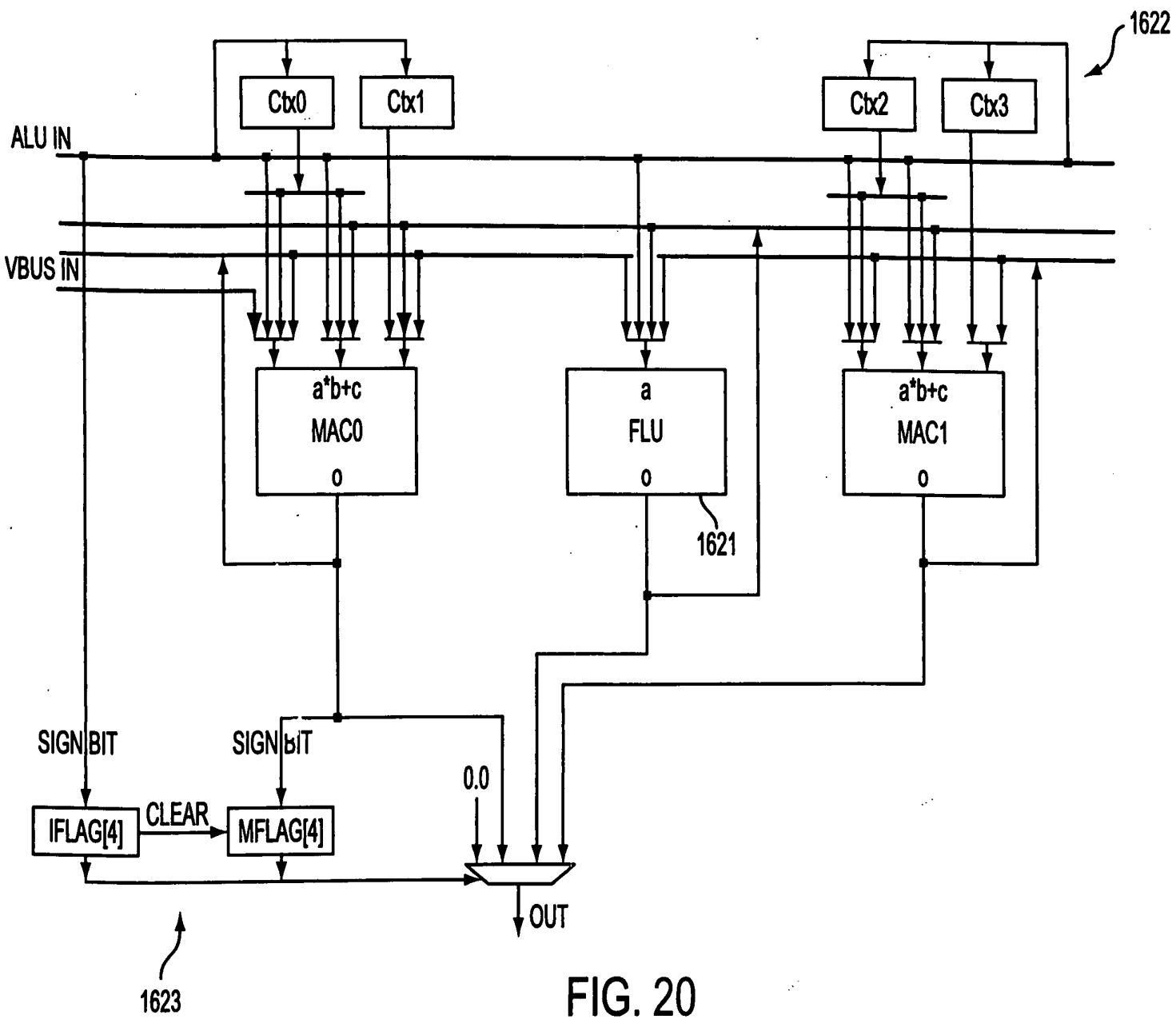
1622
Ctx0
Ctx1
Ctx2
Ctx3
ALU IN
VBUS IN
a*b+c
MAC0
o
a
FLU
o
a*b+c
MAC1
o
1621
SIGN BIT
SIGN BIT
0.0
IFLAG[4]
CLEAR
MFLAG[4]
OUT
1623

FIG. 20

NAME	REGISTER	DESCRIPTION
Z	IFLAG	CLEAR FLAG. SETS IFLAG AND MFLAG TO 0.
C	IFLAG	SPOTLIGHT CONE FLAG. SET IF VERTEX IS OUTSIDE SPOTLIGHT CONE.
S	IFLAG	SPECULAR2 FLAG. SET IF SPECULAR CONTRIBUTION IS NEGATIVE.
D	IFLAG	DIFFUSE FLAG. SET IF DIFFUSE TERM IS NEGATIVE.
	MFLAG	
U	MFLAG	SPOTLIGHT CONE ATTENUATION FLAG. SET IF SPOTLIGHT CONE ATTENUATION CONTRIBUTION IS NEGATIVE.
T	MFLAG	SPECULAR FLAG. SET IF SPECULAR CONTRIBUTION IS NEGATIVE.
R	MFLAG	RANGE FLAG. SET IF VERTEX IS TOO FAR AWAY FROM THE LIGHT.

FIG. 21

MICROCODE FIELD	BITS	LOCATION	DELAY	DESCRIPTION
oa	3	0: 2	2	OUTPUT ADDRESS
rwe	1	3	2	RLU WRITE ENABLE
rwa	2	4: 5	2	RLU WRITE ADDRESS
R23	1	6	0	RLU (MLU) READ ADDRESS
R01	1	7	1	RLU (ALU) READ ADDRESS
aia	1	8	1	ALU INPUT A MUX
alu	2	9:10	1	ALU OPERATION
mib	2	11:12	0	MLU INPUT B MUX
mia	2	13:14	0	MLU INPUT A MUX
mlu	2	15:16	0	MLU OPERATION
mwa	5	17:21	0	MLU WBUFFER READ ADDRESS
awa	5	22:26	1	ALU WBUFFER READ ADDRESS
va	4	27:30	0	VBUFFER READ ADDRESS
os	2	31:32	2	LLU OUTPUT ADDRESS
frm	6	33:38	2	FLAG REGISTER MASK
mfe	1	39	2	MFLAG WRITE ENABLE
mfa	2	40:41	2	MFLAG WRITE ADDRESS
ife	1	42	2	IFLAG WRITE ENABLE
ifa	2	43:44	2	IFLAG WRITE ADDRESS
fia	2	45:46	2	FLU INPUT A MUX
flu	3	47:49	2	FLU OPERATION
M1c	1	50	2	MAC1 INPUT C MUX
M1b	2	51:52	2	MAC1 INPUT B MUX
M1a	2	53:54	2	MAC1 INPUT A MUX
M0c	2	55:56	2	MAC0 INPUT C MUX
M0b	2	57:58	2	MAC0 INPUT B MUX
M0a	2	59:60	2	MAC0 INPUT A MUX
ce	3	61:63	0,2	CONTEXT MEMORY READ/WRITE ENABLE
ca	6	64:69	0,2	CONTEXT MEMORY ADDRESS
C3a	4	70:73	2	CONTEXT3 MEMORY ADDRESS
C2a	4	74:77	2	CONTEXT2 MEMORY ADDRESS
C1a	5	78:82	2	CONTEXT1 MEMORY ADDRESS
C0a	2	83:84	2	CONTEXT0 MEMORY ADDRESS

FIG. 22

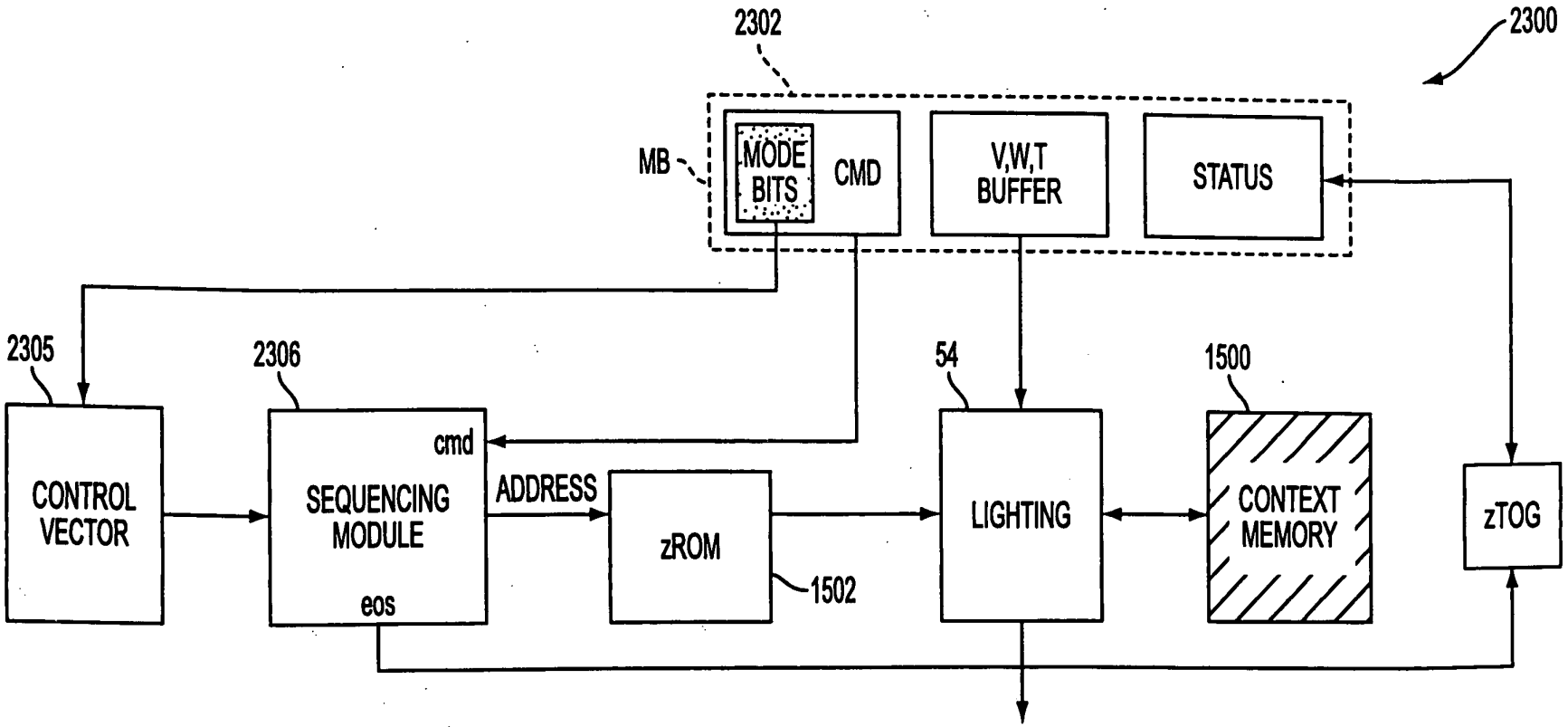
2302
2300
MB
MODE BITS
CMD
V,W,T BUFFER
STATUS
2305
2306
54
1500
CONTROL VECTOR
cmd
SEQUENCING MODULE
eos
ADDRESS
zROM
1502
LIGHTING
CONTEXT MEMORY
zTOG

FIG. 23

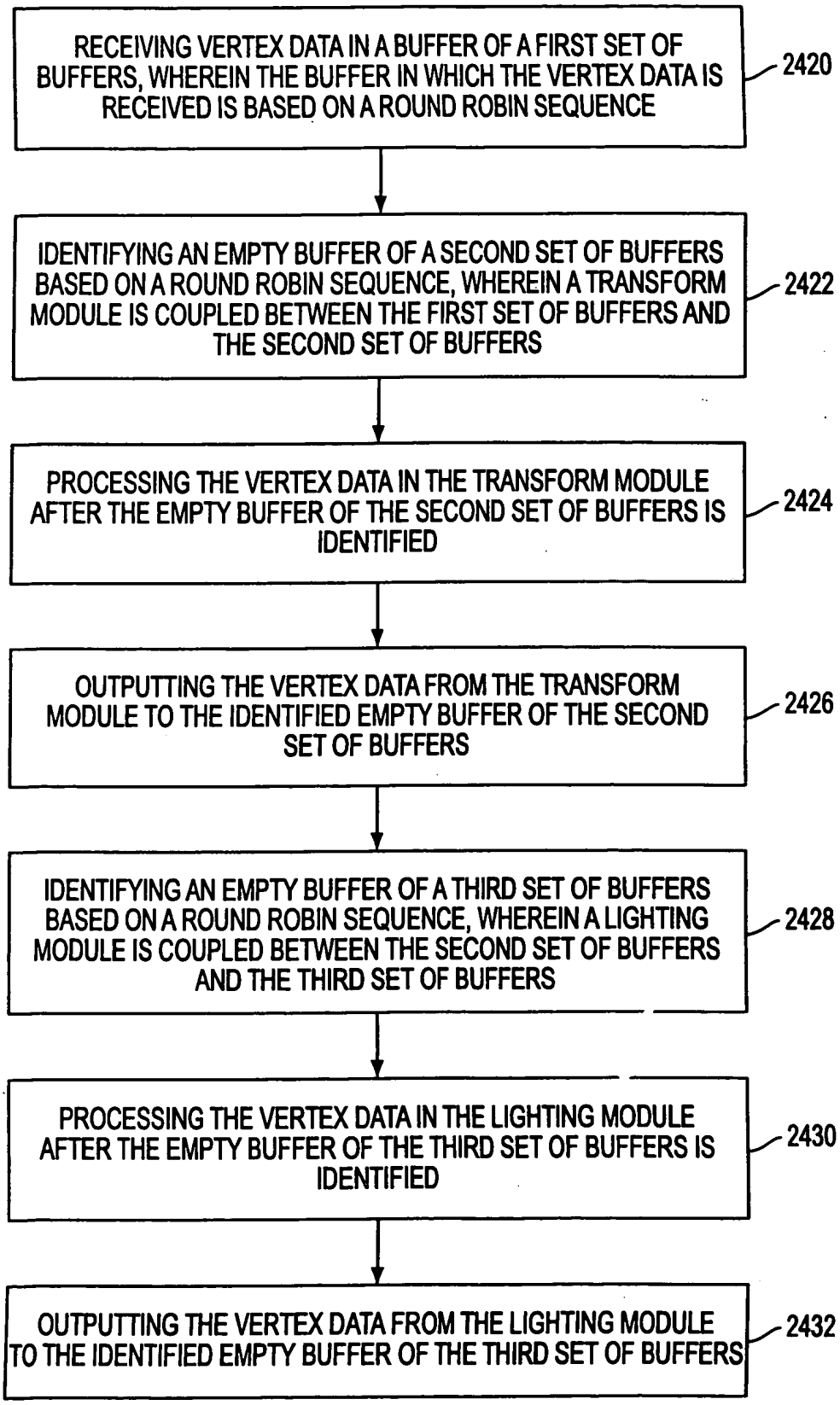
RECEIVING VERTEX DATA IN A BUFFER OF A FIRST SET OF BUFFERS, WHEREIN THE BUFFER IN WHICH THE VERTEX DATA IS RECEIVED IS BASED ON A ROUND ROBIN SEQUENCE
2420
IDENTIFYING AN EMPTY BUFFER OF A SECOND SET OF BUFFERS BASED ON A ROUND ROBIN SEQUENCE, WHEREIN A TRANSFORM MODULE IS COUPLED BETWEEN THE FIRST SET OF BUFFERS AND THE SECOND SET OF BUFFERS
2422
PROCESSING THE VERTEX DATA IN THE TRANSFORM MODULE AFTER THE EMPTY BUFFER OF THE SECOND SET OF BUFFERS IS IDENTIFIED
2424
OUTPUTTING THE VERTEX DATA FROM THE TRANSFORM MODULE TO THE IDENTIFIED EMPTY BUFFER OF THE SECOND SET OF BUFFERS
2426
IDENTIFYING AN EMPTY BUFFER OF A THIRD SET OF BUFFERS BASED ON A ROUND ROBIN SEQUENCE, WHEREIN A LIGHTING MODULE IS COUPLED BETWEEN THE SECOND SET OF BUFFERS AND THE THIRD SET OF BUFFERS
2428
PROCESSING THE VERTEX DATA IN THE LIGHTING MODULE AFTER THE EMPTY BUFFER OF THE THIRD SET OF BUFFERS IS IDENTIFIED
2430
OUTPUTTING THE VERTEX DATA FROM THE LIGHTING MODULE TO THE IDENTIFIED EMPTY BUFFER OF THE THIRD SET OF BUFFERS
2432

FIG. 24

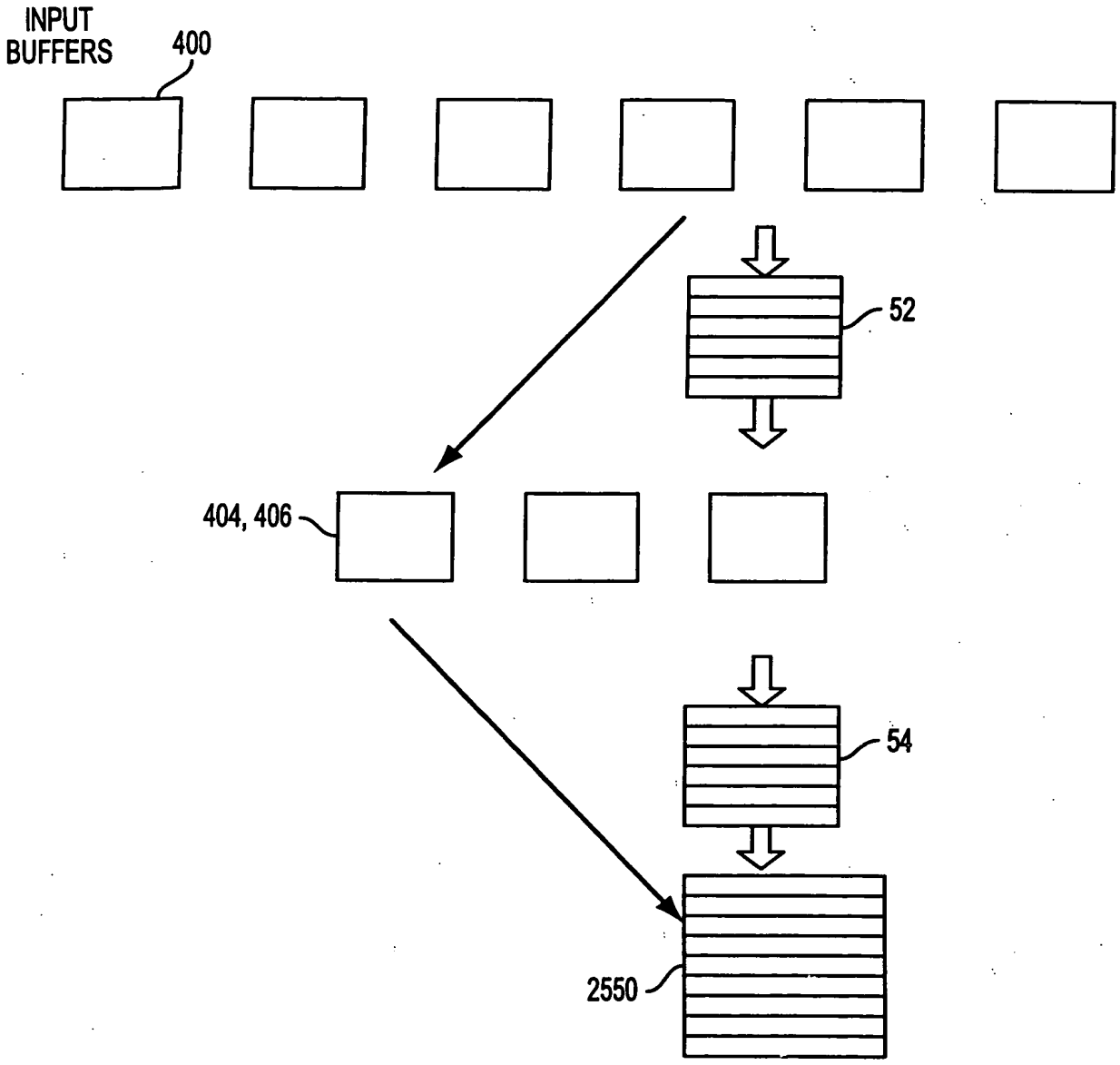

FIG. 25

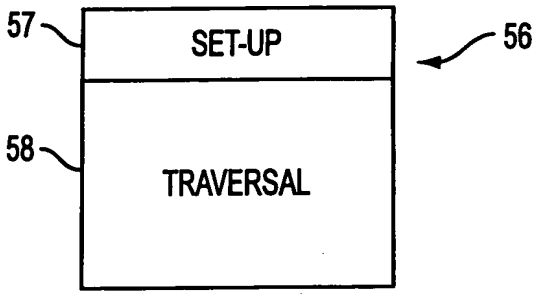

FIG. 25B

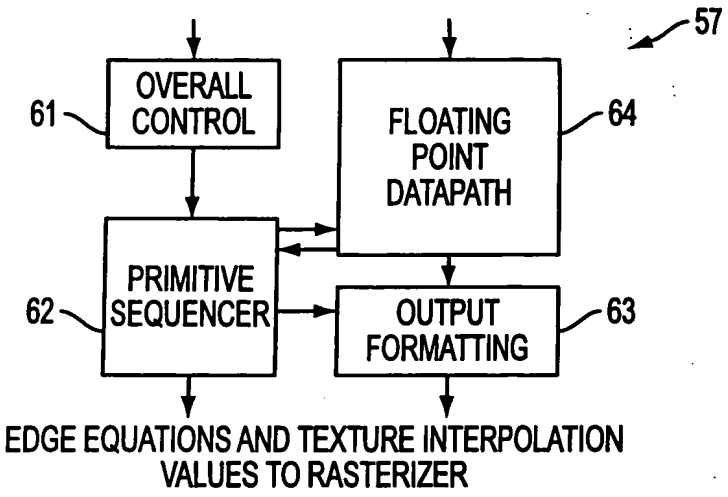

FIG. 26

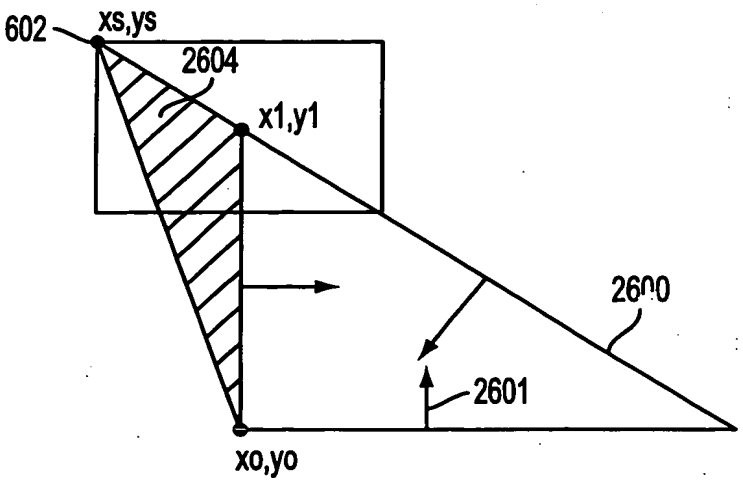

FIG. 26A

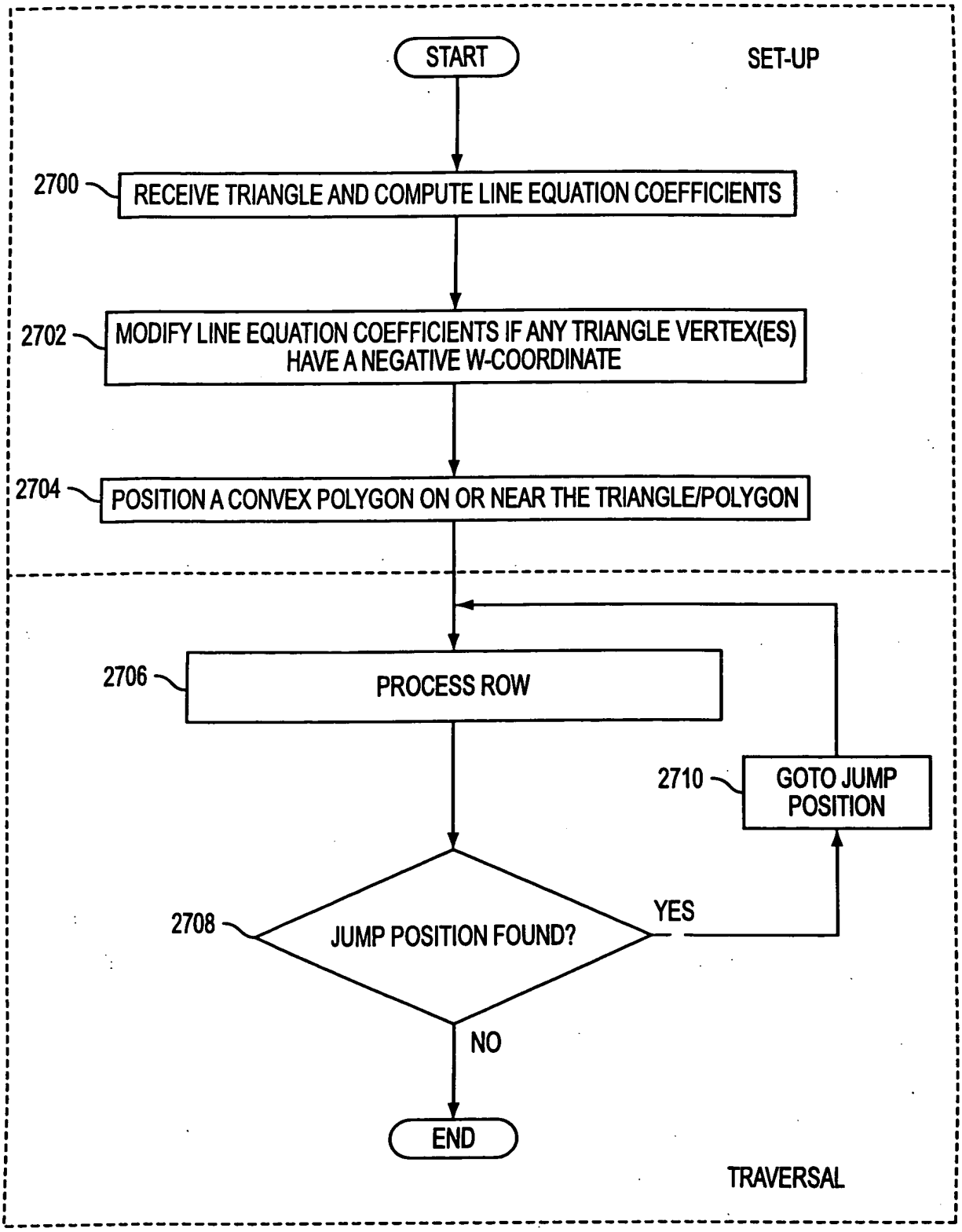
START
SET-UP
2700
RECEIVE TRIANGLE AND COMPUTE LINE EQUATION COEFFICIENTS
2702
MODIFY LINE EQUATION COEFFICIENTS IF ANY TRIANGLE VERTEX(ES) HAVE A NEGATIVE W-COORDINATE
2704
POSITION A CONVEX POLYGON ON OR NEAR THE TRIANGLE/POLYGON
2706
PROCESS ROW
2710
GOTO JUMP POSITION
2708
JUMP POSITION FOUND?
YES
NO
END
TRAVERSAL

FIG. 27

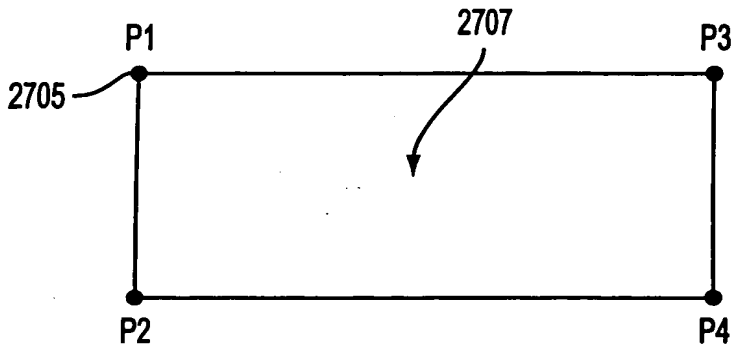

FIG. 27A

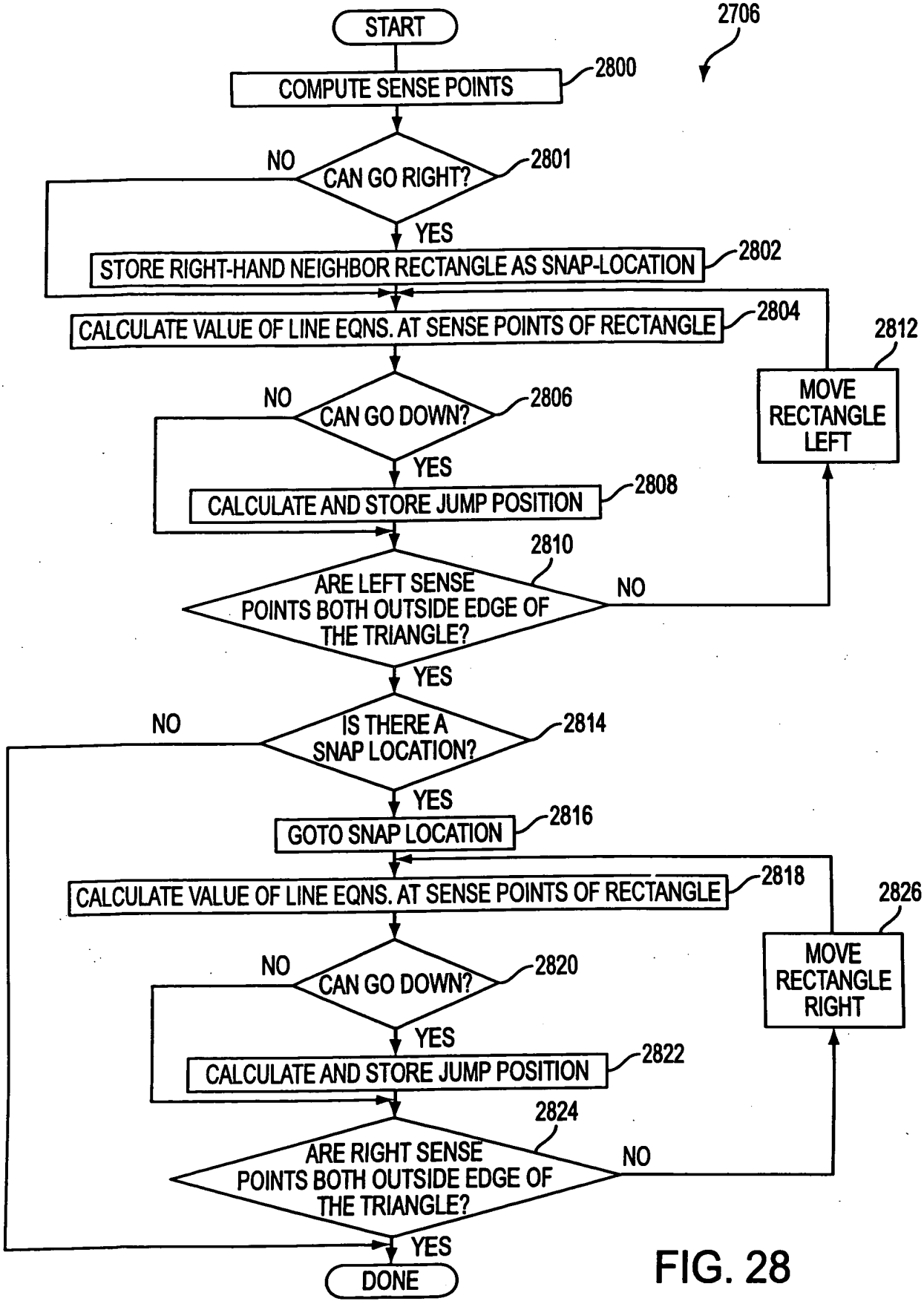
2706
START
COMPUTE SENSE POINTS
2800
NO
CAN GO RIGHT?
2801
YES
STORE RIGHT-HAND NEIGHBOR RECTANGLE AS SNAP-LOCATION
2802
CALCULATE VALUE OF LINE EQNS. AT SENSE POINTS OF RECTANGLE
2804
2812
MOVE RECTANGLE LEFT
NO
CAN GO DOWN?
2806
YES
CALCULATE AND STORE JUMP POSITION
2808
2810
ARE LEFT SENSE POINTS BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
YES
NO
IS THERE A SNAP LOCATION?
2814
YES
GOTO SNAP LOCATION
2816
CALCULATE VALUE OF LINE EQNS. AT SENSE POINTS OF RECTANGLE
2818
2826
MOVE RECTANGLE RIGHT
NO
CAN GO DOWN?
2820
YES
CALCULATE AND STORE JUMP POSITION
2822
2824
ARE RIGHT SENSE POINTS BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
YES
DONE

FIG. 28

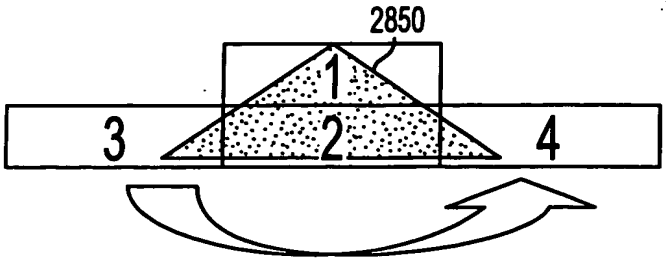

FIG. 28A

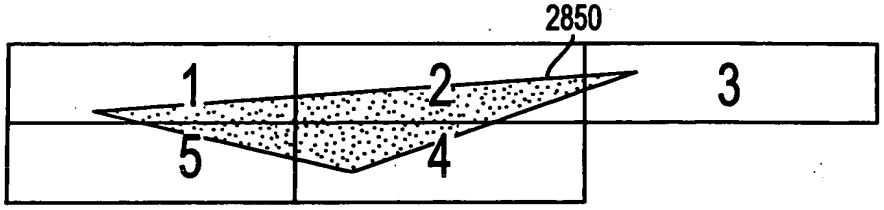

FIG. 28B

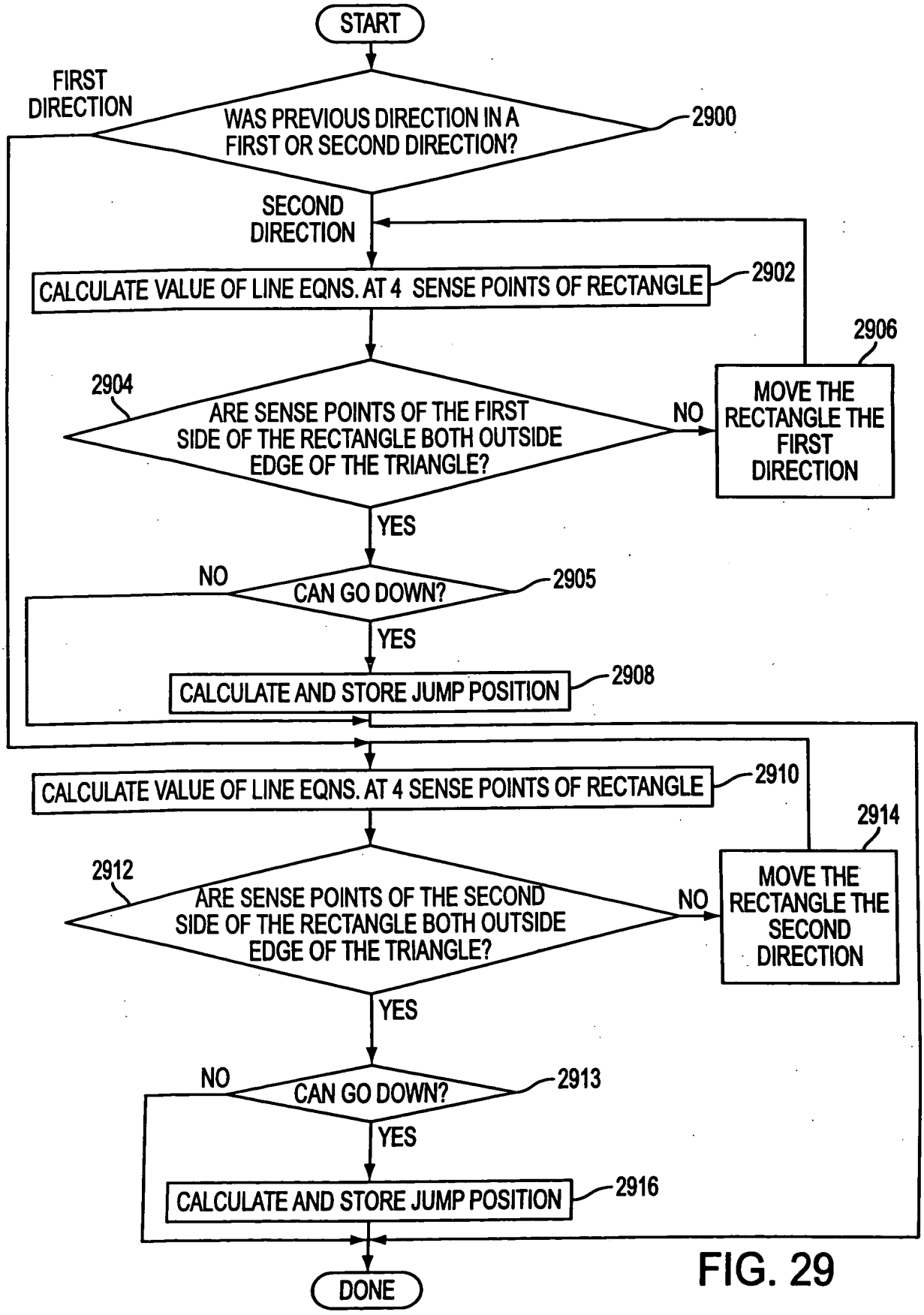
START
FIRST DIRECTION
WAS PREVIOUS DIRECTION IN A FIRST OR SECOND DIRECTION?
2900
SECOND DIRECTION
CALCULATE VALUE OF LINE EQNS. AT 4 SENSE POINTS OF RECTANGLE
2902
2906
2904
ARE SENSE POINTS OF THE FIRST SIDE OF THE RECTANGLE BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
MOVE THE RECTANGLE THE FIRST DIRECTION
YES
NO
CAN GO DOWN?
2905
YES
CALCULATE AND STORE JUMP POSITION
2908
CALCULATE VALUE OF LINE EQNS. AT 4 SENSE POINTS OF RECTANGLE
2910
2914
2912
ARE SENSE POINTS OF THE SECOND SIDE OF THE RECTANGLE BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
MOVE THE RECTANGLE THE SECOND DIRECTION
YES
NO
CAN GO DOWN?
2913
YES
CALCULATE AND STORE JUMP POSITION
2916
DONE

FIG. 29

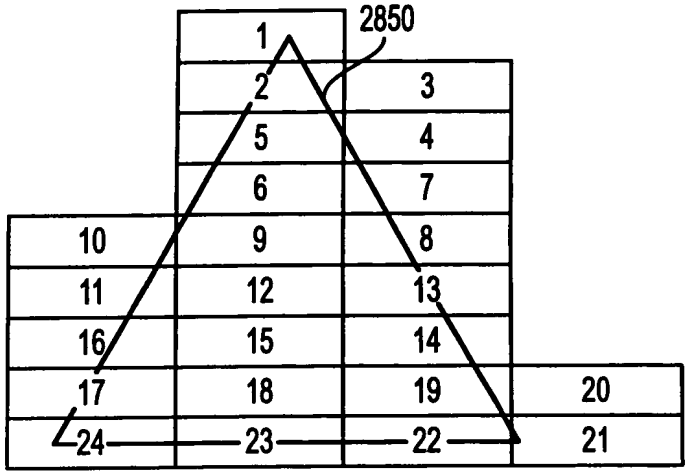

FIG. 29A

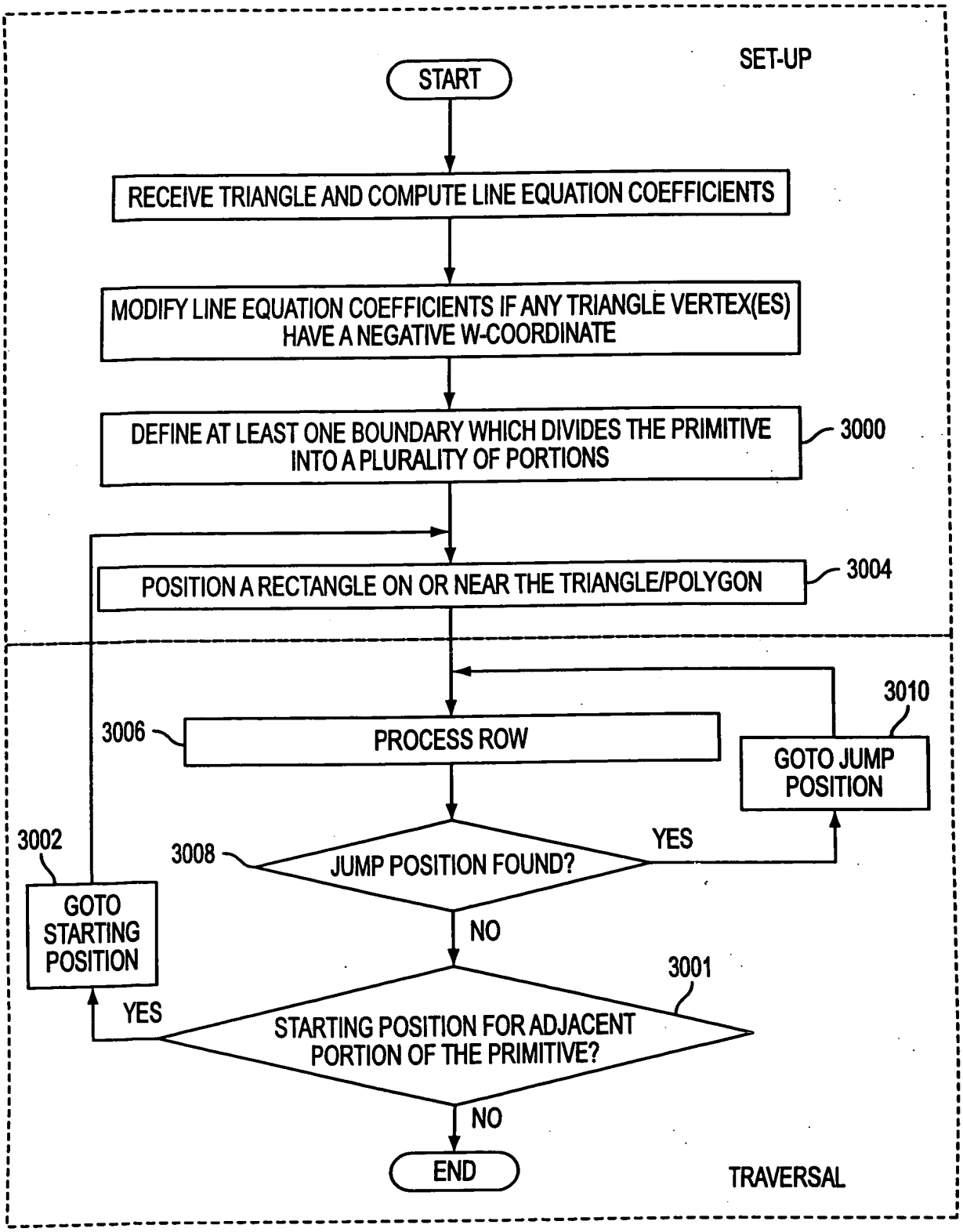
SET-UP
START
RECEIVE TRIANGLE AND COMPUTE LINE EQUATION COEFFICIENTS
MODIFY LINE EQUATION COEFFICIENTS IF ANY TRIANGLE VERTEX(ES) HAVE A NEGATIVE W-COORDINATE
DEFINE AT LEAST ONE BOUNDARY WHICH DIVIDES THE PRIMITIVE INTO A PLURALITY OF PORTIONS
3000
POSITION A RECTANGLE ON OR NEAR THE TRIANGLE/POLYGON
3004
3010
3006
PROCESS ROW
GOTO JUMP POSITION
3002
3008
JUMP POSITION FOUND?
YES
GOTO STARTING POSITION
NO
3001
YES
STARTING POSITION FOR ADJACENT PORTION OF THE PRIMITIVE?
NO
END
TRAVERSAL

FIG. 30

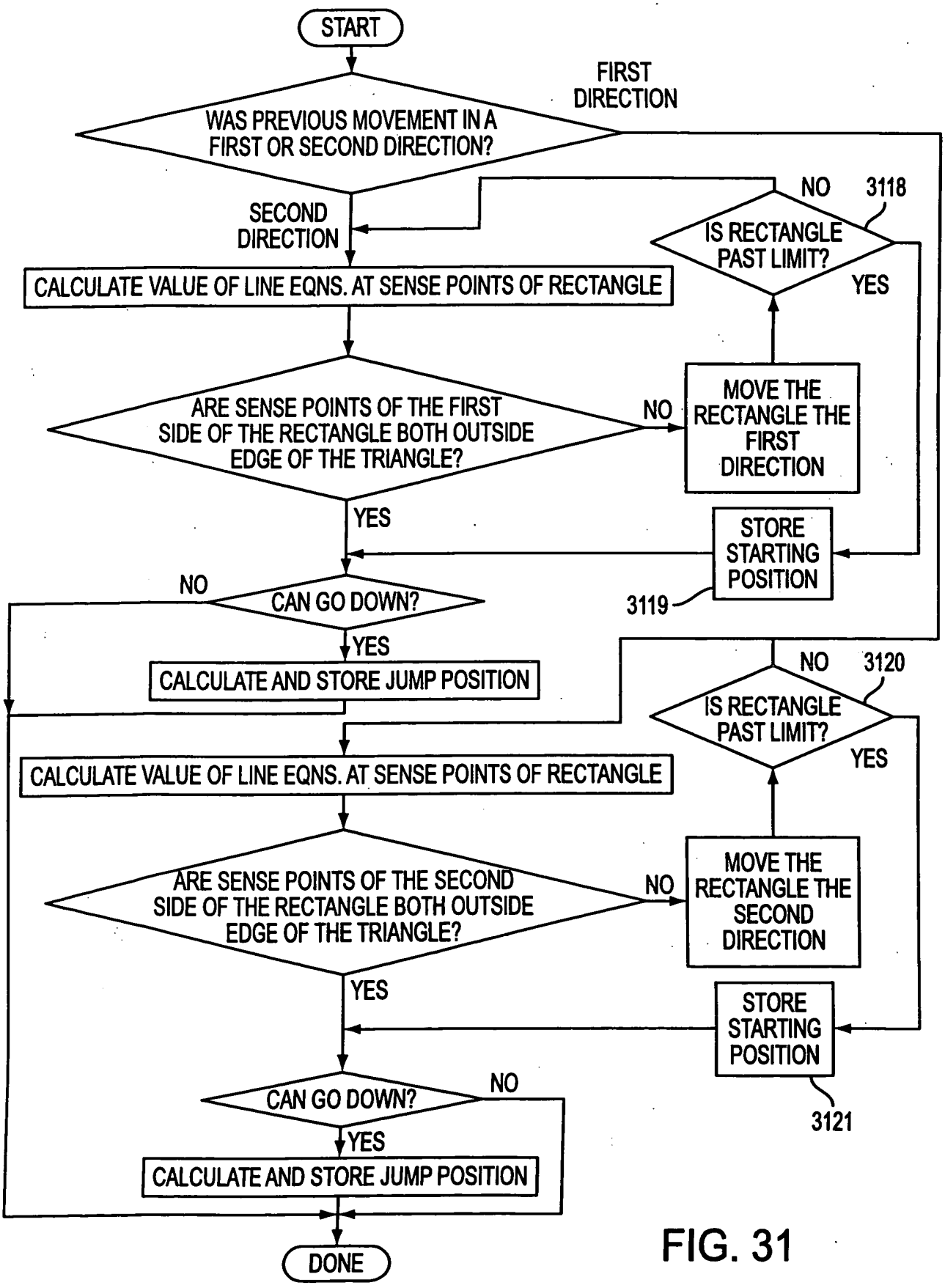
START
WAS PREVIOUS MOVEMENT IN A FIRST OR SECOND DIRECTION?
FIRST DIRECTION
SECOND DIRECTION
CALCULATE VALUE OF LINE EQNS. AT SENSE POINTS OF RECTANGLE
ARE SENSE POINTS OF THE FIRST SIDE OF THE RECTANGLE BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
MOVE THE RECTANGLE THE FIRST DIRECTION
YES
NO
3118
IS RECTANGLE PAST LIMIT?
YES
STORE STARTING POSITION
3119
NO
CAN GO DOWN?
YES
CALCULATE AND STORE JUMP POSITION
CALCULATE VALUE OF LINE EQNS. AT SENSE POINTS OF RECTANGLE
ARE SENSE POINTS OF THE SECOND SIDE OF THE RECTANGLE BOTH OUTSIDE EDGE OF THE TRIANGLE?
NO
MOVE THE RECTANGLE THE SECOND DIRECTION
YES
NO
3120
IS RECTANGLE PAST LIMIT?
YES
STORE STARTING POSITION
3121
NO
CAN GO DOWN?
YES
CALCULATE AND STORE JUMP POSITION
DONE

FIG. 31

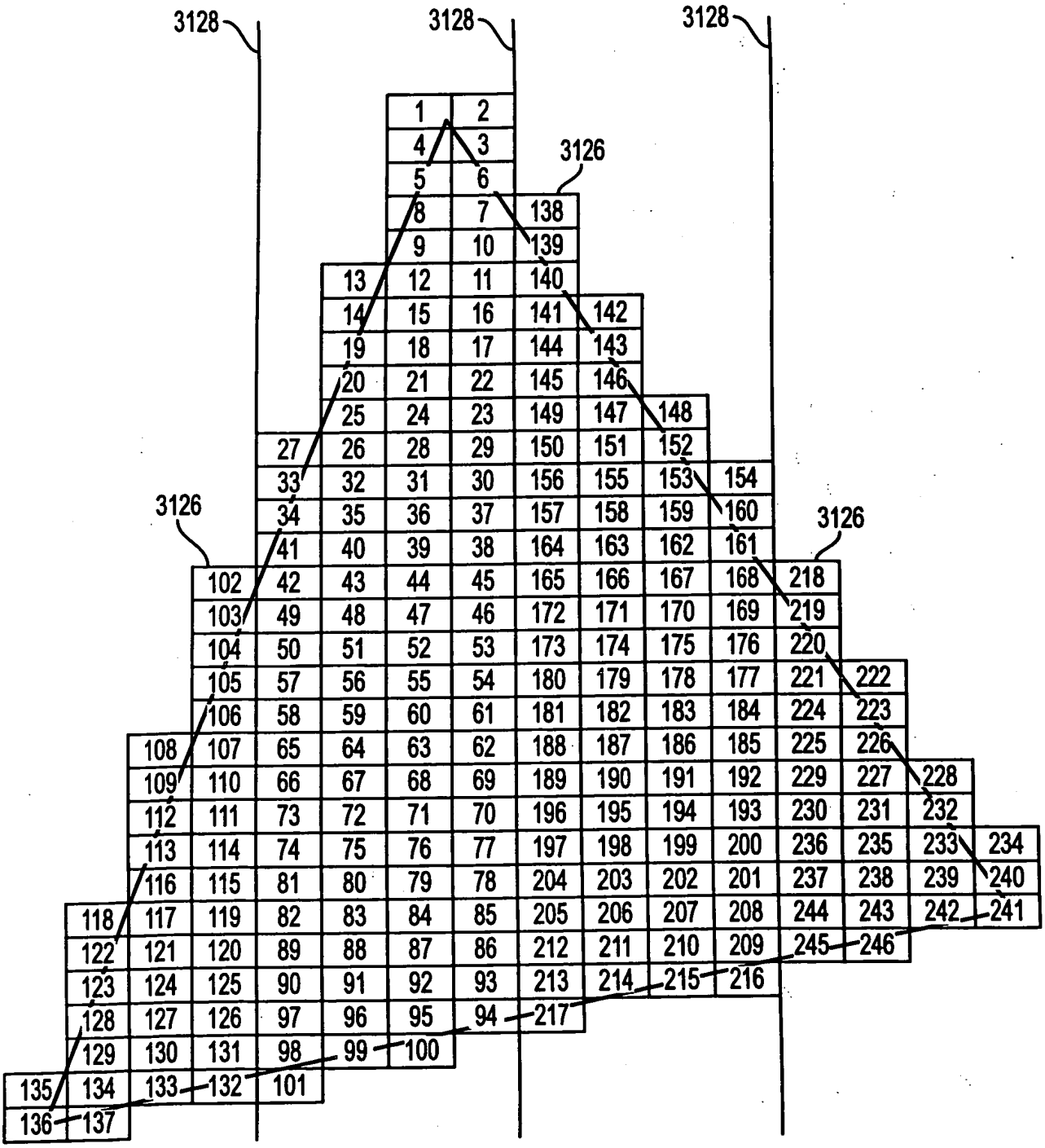
3128
3128
3128
3126
3126
3126
1 2
4 3
5 6
8 7 138
9 10 139
13 12 11 140
14 15 16 141 142
19 18 17 144 143
20 21 22 145 146
25 24 23 149 147 148
27 26 28 29 150 151 152
33 32 31 30 156 155 153 154
34 35 36 37 157 158 159 160
41 40 39 38 164 163 162 161
102 42 43 44 45 165 166 167 168 218
103 49 48 47 46 172 171 170 169 219
104 50 51 52 53 173 174 175 176 220
105 57 56 55 54 180 179 178 177 221 222
106 58 59 60 61 181 182 183 184 224 223
108 107 65 64 63 62 188 187 186 185 225 226
109 110 66 67 68 69 189 190 191 192 229 227 228
112 111 73 72 71 70 196 195 194 193 230 231 232
113 114 74 75 76 77 197 198 199 200 236 235 233 234
116 115 81 80 79 78 204 203 202 201 237 238 239 240
118 117 119 82 83 84 85 205 206 207 208 244 243 242 241
122 121 120 89 88 87 86 212 211 210 209 245 246
123 124 125 90 91 92 93 213 214 215 216
128 127 126 97 96 95 94 217
129 130 131 98 99 100
135 134 133 132 101
136 137

FIG. 31A

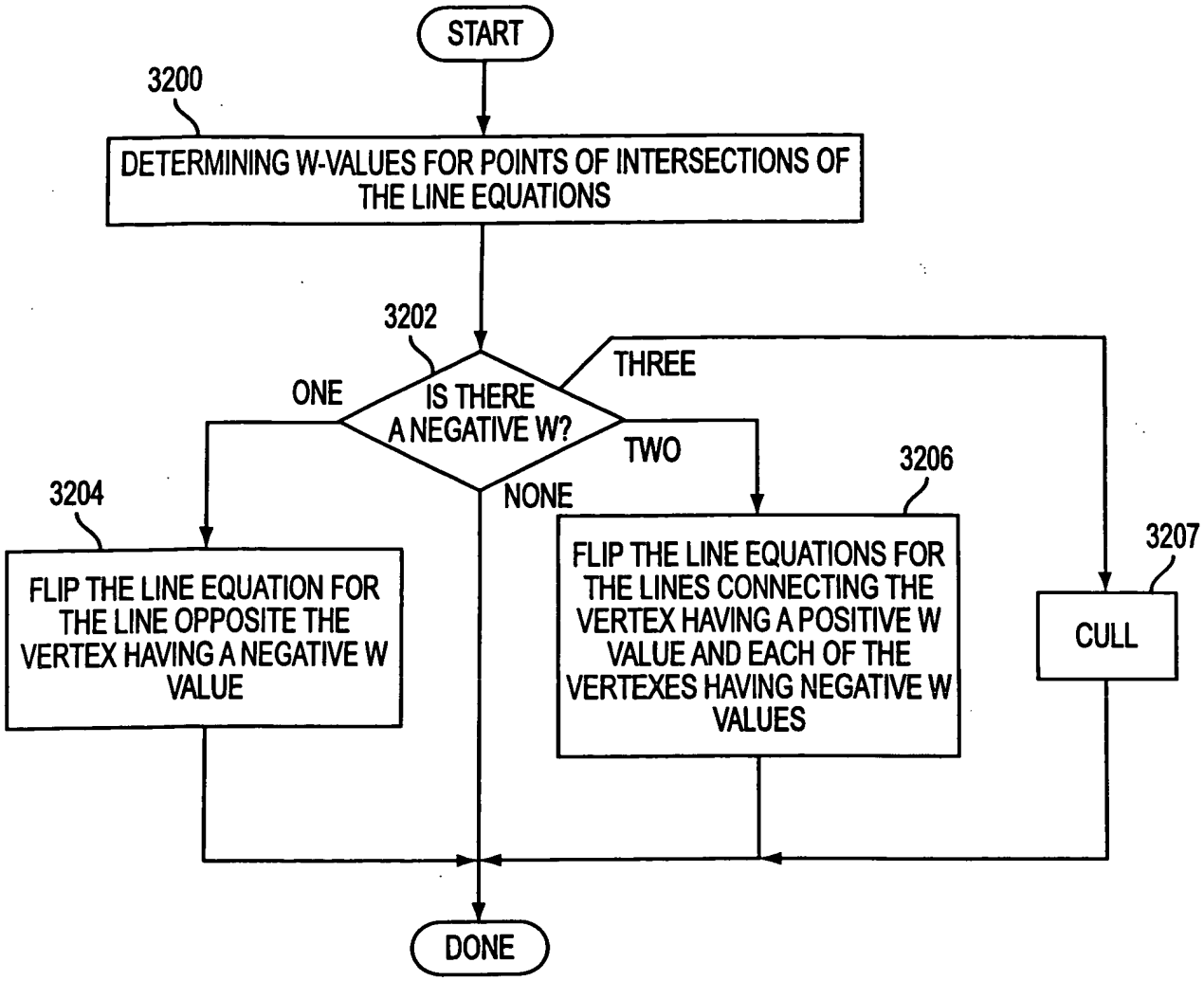
START
3200
DETERMINING W-VALUES FOR POINTS OF INTERSECTIONS OF THE LINE EQUATIONS
3202
IS THERE A NEGATIVE W?
ONE
TWO
THREE
NONE
3204
FLIP THE LINE EQUATION FOR THE LINE OPPOSITE THE VERTEX HAVING A NEGATIVE W VALUE
3206
FLIP THE LINE EQUATIONS FOR THE LINES CONNECTING THE VERTEX HAVING A POSITIVE W VALUE AND EACH OF THE VERTEXES HAVING NEGATIVE W VALUES
3207
CULL
DONE

FIG. 32

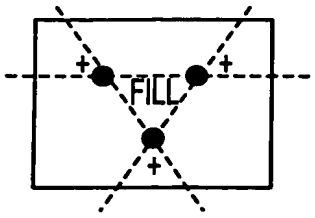

FIG. 32A

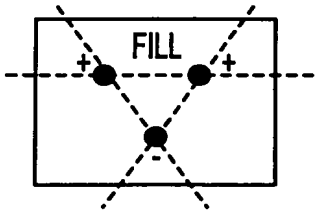

FIG. 32B

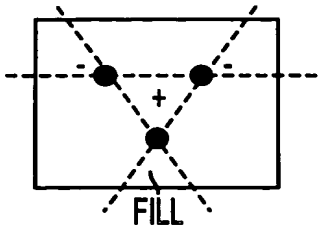

FIG. 32C